APPENDIX NOT INCLUDED

NPC SERVICES, INC.
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August 20, 2014

Mr. Bartolome J. Cañellas (6SF-RL)
US Environmental Protection Agency
1445 Ross Avenue
Dallas, TX 75202-2733

Mr. Gary A. Fulton, Jr.
Remediation Services Division
Louisiana Department of Environmental Quality
P.O. Box 4314
Baton Rouge, LA 70821-4314

RE: Petro-Processors of Louisiana, Inc. Site – Brooklawn OU
Addendum J to the Remedial Planning Activities Report
Brooklawn Primary Transect Investigation
AI#2469, LAD057482713

Dear Mr. Cañellas and Mr. Fulton:

Please find enclosed Addendum J to the Remedial Planning Activities (RPA) Report for the Brooklawn OU dated August 12, 2014. This RPA report has been prepared in response to actions specified in Addendum J to the Work Plan to investigate increasing COC concentrations along the Brooklawn Primary Transect (BPT). The extent of COC along the BPT has been determined and additional actions are required. A work plan will be submitted shortly to implement the installation of additional monitoring wells recommended in the report and to update the groundwater flow and solute transport model with contemporaneous data.

NPC has provided three (3) copies to EPA and three (3) copies to LDEQ of Addendum J to the RPA for your approval.

Very truly yours,

BMcReynolds

Bryan McReynolds, P.E.
Environmental Engineer

cc: Mr. Keith Horn, LDEQ (without enclosure)

9836524

ADDENDUM J

TO THE

REMEDIAL PLANNING ACTIVITIES REPORT

FOR THE
PETRO-PROCESSORS OF LOUISIANA, INC. SITE
BROOKLAWN OPERABLE UNIT

LAD057482713
LDEQ AI#2469

BROOKLAWN PRIMARY TRANSECT INVESTIGATION

NPC SERVICES, INC.
BATON ROUGE, LOUISIANA

August 12, 2014

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LIST OF ACRONYMS

AB	Alluvial Base
BBR	Bayou Baton Rouge
BPT	Brooklawn Primary Transect
bgs	Below ground surface
CD	Consent Decree
COC	Contaminants of Concern
DCA	1,2-Dichloroethane
DCE	cis- and trans-1,2-Dichloroethene
DNAPL	Dense Non-Aqueous Phase Liquids
DWT	Deep Water Table
GWS	Ground Water Sample
LDEQ or DEQ	Louisiana Department of Environmental Quality
LTMP	Long Term Monitoring Plan
NA	Natural Attenuation
MCL	Maximum Contaminate Level
MNA	Monitored Natural Attenuation
MT3D	Mass Transport in 3 Dimensions
MSL	Mean sea level
NPC	NPC Services, Inc.
OU	Operational Unit
PCE	Perchloroethylene (Tetrachlorethene)
POC	Point of Compliance
POE	Point of Exposure
PPI	Petro-Processors of Louisiana, Inc. Site
RA	Remedial Actions
RDCP	Remedial Design and Construction Plans
RPA	Remedial Planning Activity
RT3D	Reactive Transport in 3 Dimensions
SWT	Shallow Water Table
TCA	1,1,2-Trichloroethane
TCE	Trichloroethylene
TeCA	1,1,2,2-Tetrachloroethane
TOC	Total Organic Carbon
USEPA or EPA	US Environmental Protection Agency
VC	Vinyl chloride
WP	Work Plan

ADDENDUM J
REMEDIAL PLANNING ACTIVITIES REPORT
PETRO-PROCESSORS OF LOUISIANA, INC., BROOKLAWN OU
PRIMARY TRANSECT INVESTIGATION

EXECUTIVE SUMMARY

Objectives defined in Addendum J to the Work Plan were successfully completed; this document reports on the activities and presents data collected during the investigation. The extent of groundwater contaminants of concern were determined by the procedures outlined in the work plan. Contaminants of concern have migrated approximately 210 feet downgradient from monitoring location P-1627-1, the last monitoring location along the Brooklawn OU primary transport pathway. Estimated solute transport of contaminants in the alluvial sediments south of the Brooklawn disposal area were determined to be approximately 30 feet per day. As a result, the transport of contaminant to downgradient point of compliance locations and the defined point of exposure, the Mississippi River, is not imminent. Estimated contaminant arrival times to these locations are on the order of decades to a century, respectively, if transport is unimpeded. Natural attenuation processes which are well documented at the site may limit transport. To investigate solute transport additional monitoring wells will be installed downgradient and lateral to the primary transport pathway.

Contemporaneous contaminant, geochemical and lithology data from these newly installed monitoring wells will be used to update the groundwater flow and solute transport model. The updated model will assess current contaminant concentration trends with respect to performance of the approved MNA remedial action. Furthermore, a recent investigation by LSU has demonstrated that the reductive dehalogenation processes included in the current groundwater model require revision. The research by LSU has provided information related to the reduction of mixtures of chlorinated alkanes present in the Brooklawn source area. Predominant alkanes in the source area, 1,1,2-Trichloroethane and 1,2-Dichloroethane, were thought to undergo concurrent transformation by microbially mediated reductive dechlorination. However, a recently published paper shows that with bacteria isolated from the Brooklawn site, the reduction of these contaminants is sequential. The updated solute transport model will incorporate this information.

Installations of the new monitoring wells are anticipated in the fall of 2014, during low Mississippi River stage. The updated groundwater flow and solute transport model will be completed in 2015.

1.0 INTRODUCTION

1.1 Overview

This Addendum J to the Remedial Planning Activities (RPA) Report details the findings of the investigation completed in accordance with Addendum J to the Work Plan (WP) (NPC, 2012) at the Petro-Processors of Louisiana, Inc. (PPI) site, Brooklawn Operational Unit (OU). Addendum J to the WP specified additional characterization of the primary ground water pathway at the Brooklawn OU south of the former waste disposal area designated as the Brooklawn Primary Transect (BPT). This report supplements the previously approved WP and RPA Reports. Recommendations for remedial actions (RA) presented in this report are a continuation of the currently approved remedies and are based on the objectives stated in the Consent Decree (CD), Work Plans, and previously approved RPA Reports.

The primary transport pathway for ground water Contaminants of Concern (COC) at the Brooklawn OU are within alluvial deposits south of the former waste disposal area. Figure 1-1, shows an aerial view of the PPI site's OUs and the area of investigation at the primary transect location where the activities of Addendum J to the WP were conducted. Figure 1-2 shows a representation of a cross section along the contaminant transport pathway in the alluvial aquifer south of the Brooklawn source area. Ground water samples were collected within the alluvial deposits.

The goal of this addendum is to report on the completed work plan activities and present additional actions necessary to characterize transport of COC along the BPT at the Brooklawn OU.

Figure 1-1. Regional Map showing both of the PPI Site Operable Units and the area of investigation at the Brooklawn OU primary transect location

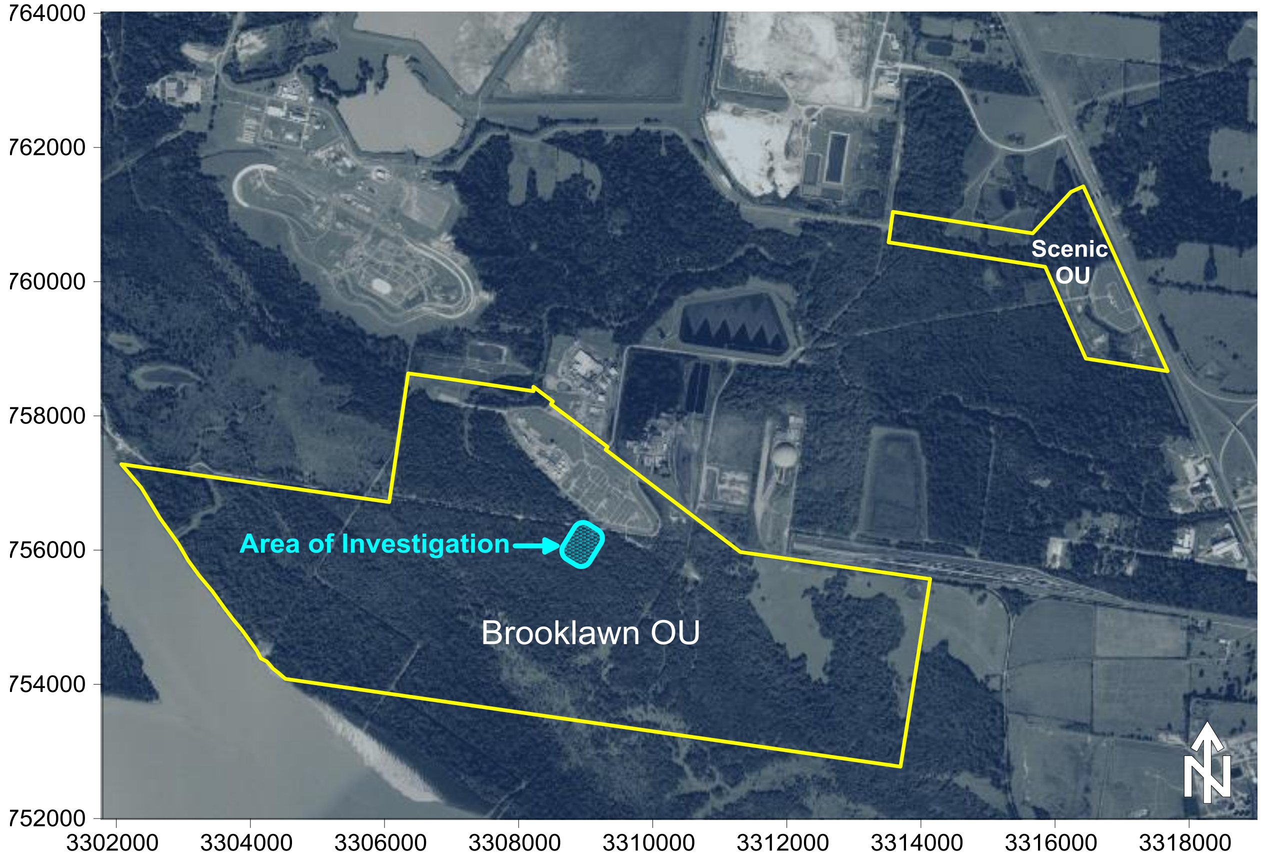
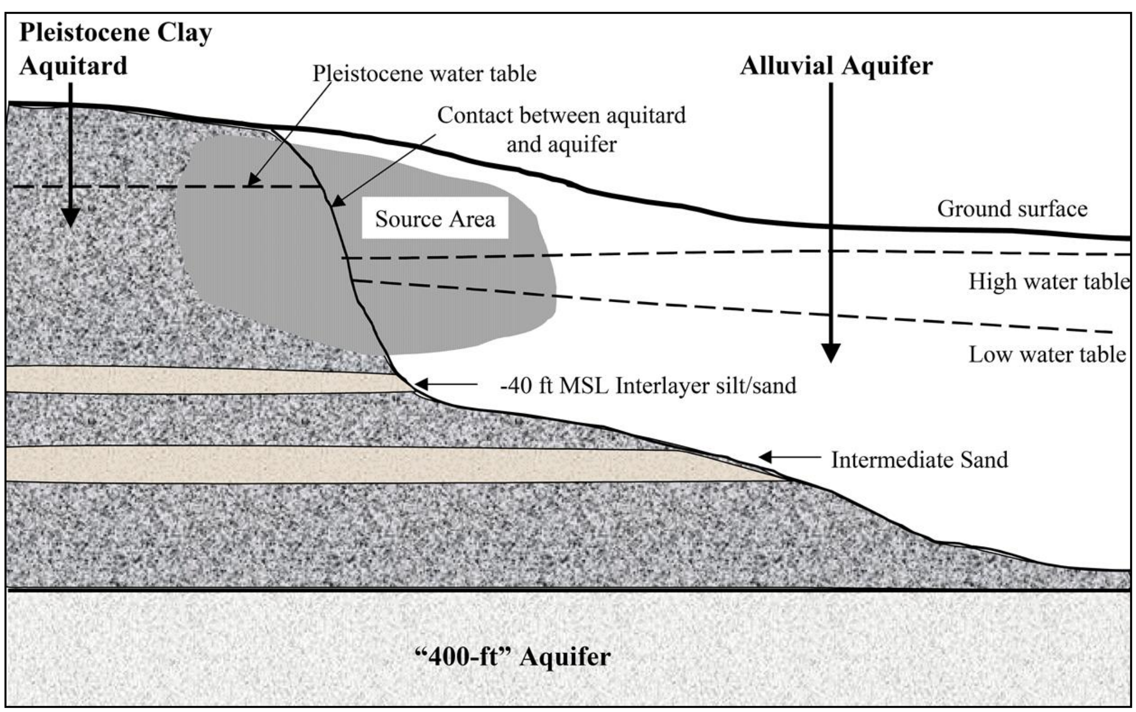


Figure 1-2. Conceptual representation of a cross section along the contaminant transport path in the alluvial aquifer south of the Brooklawn source area

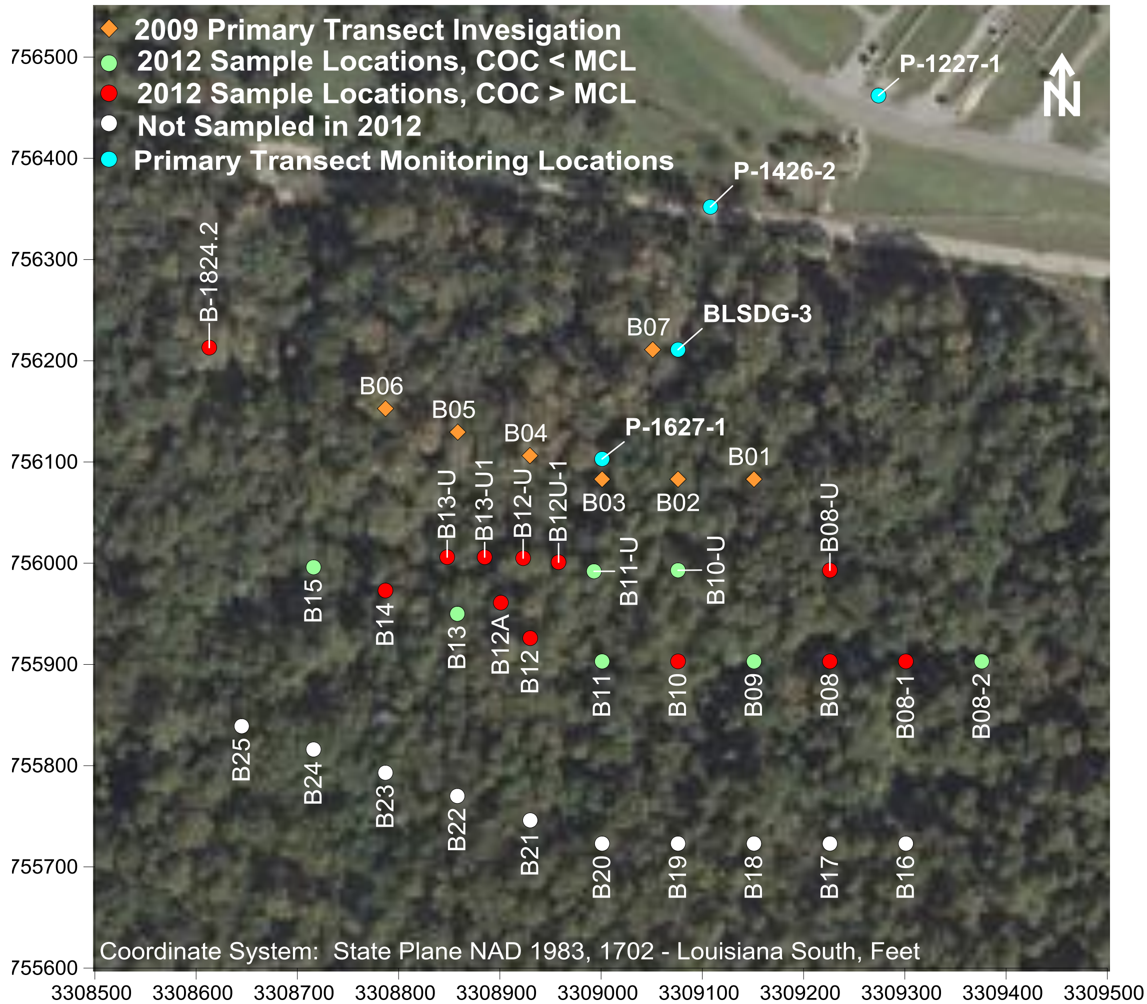


1.2 Background

In 2009, NPC received approval from the Environmental Protection Agency (EPA) Region VI and the Louisiana Department of Environmental Quality (LDEQ) (herein, "Agencies"), to conduct an investigation in the area of the BPT. During that investigation Cone Penetrometer Testing (CPT) data and ground water samples were collected at fifteen (15) locations B01-B15. CPT data was collected in October 2009, within the alluvial deposits of the SWT and DWT. Data from the 2009 investigation was previously reported in the 2009 LTMP Report (NPC, 2010). Appendix A to this RPA report contains the tables and figures referenced in this section. Locations where CPT logs were generated are shown in Appendix A, Table 34, which also contains a cross reference to the ground water samples collected; and, Appendix A, Table 35, displays the coordinates for each location. Appendix A, Table 36, displays COC data for the samples collected; and, Appendix A, Table 37, shows the data reduced to maximum COC values at each location. Using this point-in-time data and long term monitoring data collected in 2009, contaminant contours for VC were constructed and are shown in Appendix A, Figure 39. CPT logs are also presented in Appendix A.

Upon approval of Addendum J to the Work Pan (NPC, 2012) by the Agencies in August 2012, NPC conducted an expanded investigation at locations identified in Figure 1-3. Data from the 2012 investigation was reported by letter to the Agencies on October 27, 2013. The letter also requested that an additional investigation be conducted the following year in 2013. During the 2013 investigation samples were again collected using a GeoProbe® SP-16 sampler at low Mississippi River stage. Data from these investigations are presented in Section 2.1.

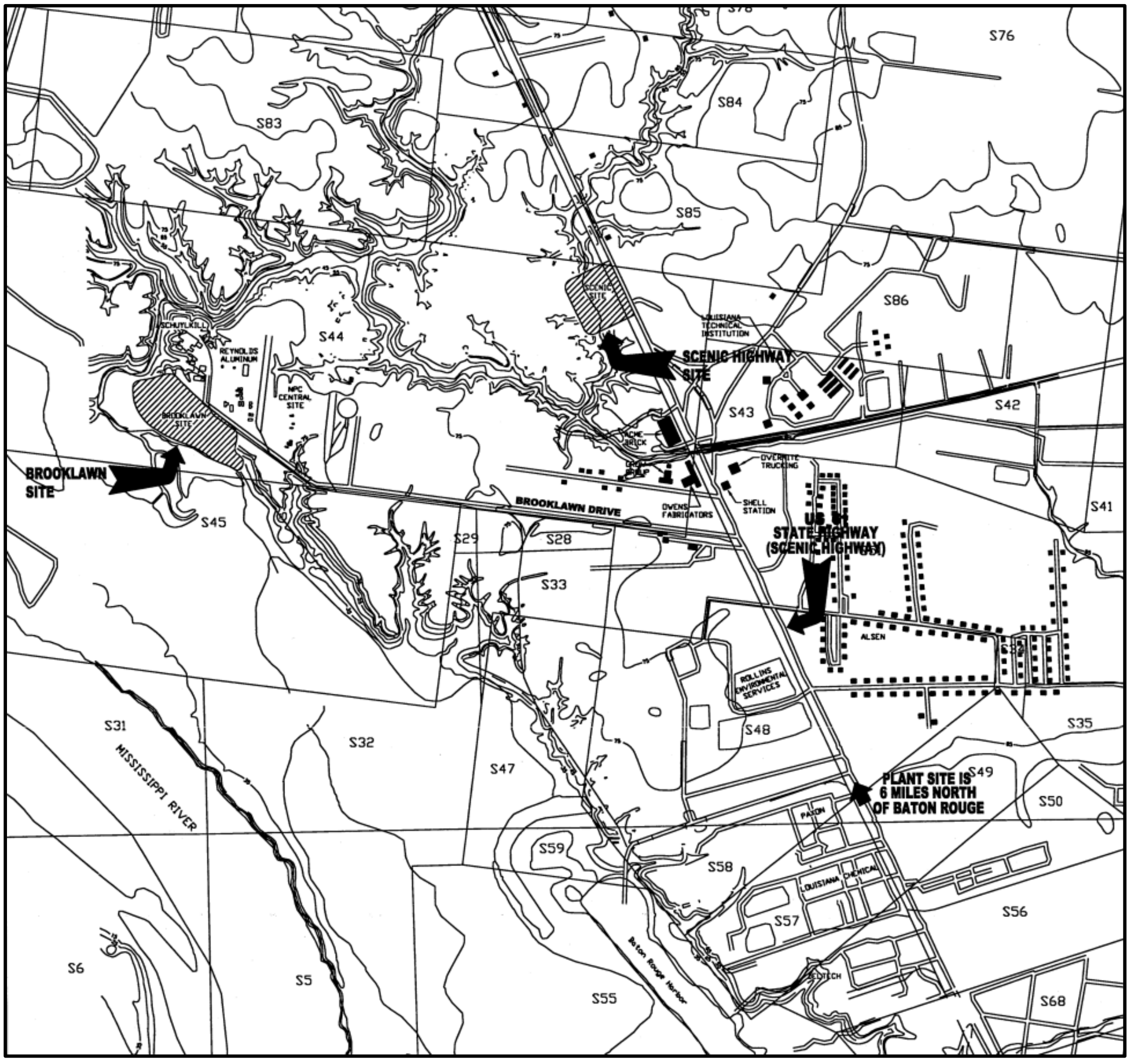
Figure 1-3. Sample locations for the Brooklawn Primary Transect investigation conducted in 2009 and 2012. See Figure 2-2 for locations sampled in 2013.



1.3 Setting

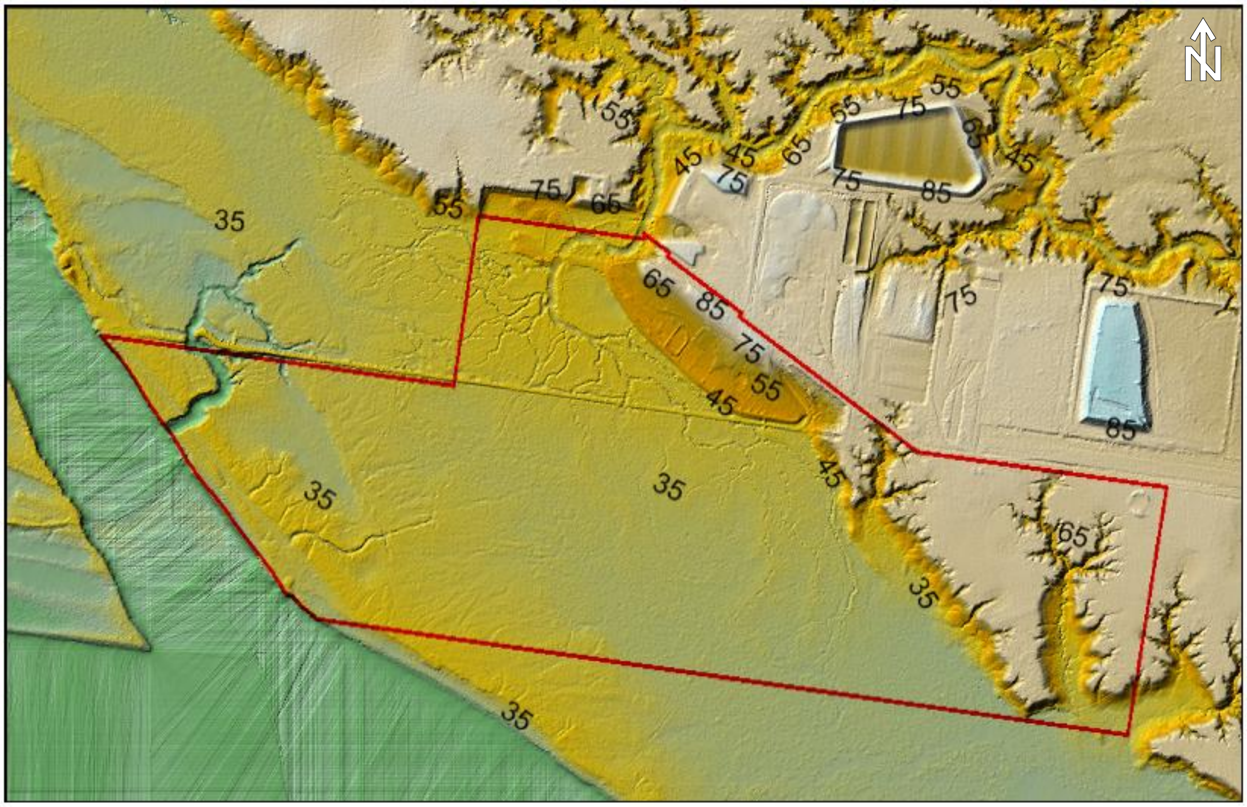
The Brooklawn OU is located in the northwestern portion of East Baton Rouge Parish on Brooklawn Drive approximately one and one half miles west of Scenic Highway as shown on the vicinity map in Figure 1-4.

Figure 1-4. Vicinity map showing the Brooklawn OU located west of US Highway 61, Scenic Highway.



The Brooklawn OU covers approximately 80 acres including the disposal area and the adjacent Bayou Baton Rouge (BBR) area. The Brooklawn OU has ground surface elevations ranging from approximately 35 feet Mean Sea Level (MSL) along the floodplain of the Mississippi River to an elevation of approximately 75 feet MSL on top of the bluff which borders the northern portion of the site as shown in Figure 1-5.

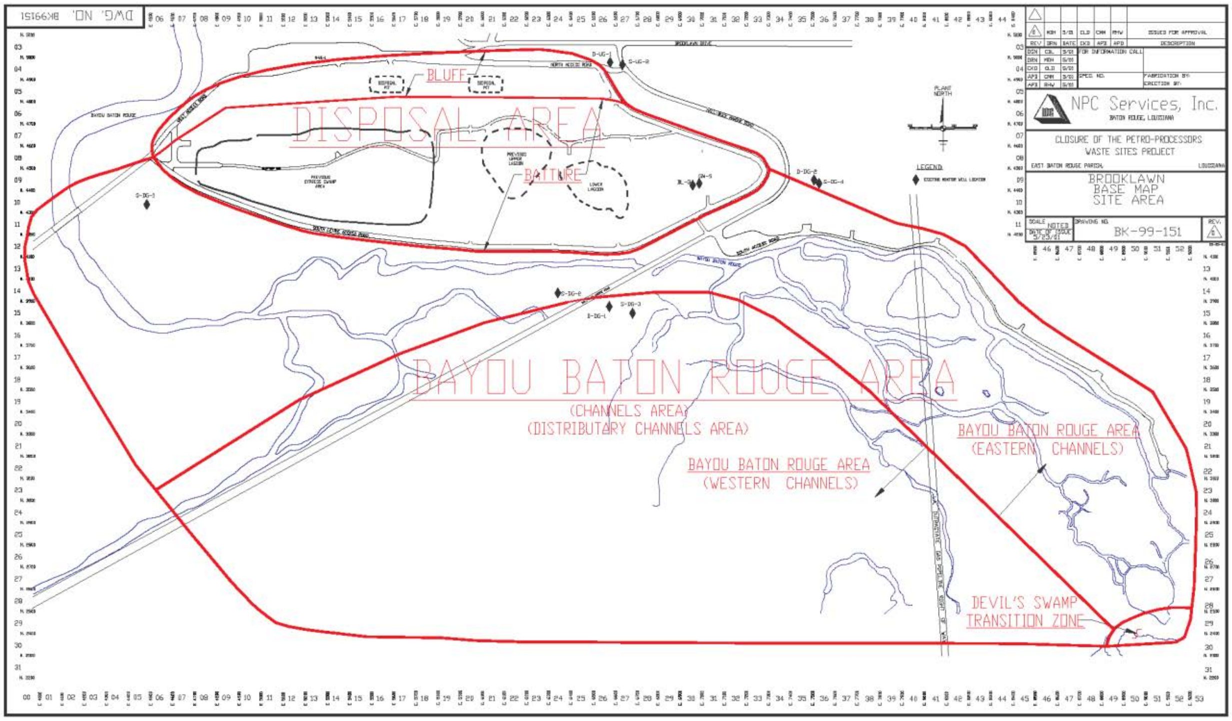
Figure 1-5. Topographic Map of the PPI site, Brooklawn OU



Note: The red line depicts the property owned by NPC Services, Inc.; the numbers represent ground surface elevations. See Drawing 1-1 for location of the disposal area.

Former disposal areas include lagoons in the alluvial area and pits in the Pleistocene area as shown in Drawing 1-1. The Brooklawn disposal area has a minimum elevation of approximately 55 feet MSL. Stratigraphic investigations show that the site is divided into either Pleistocene terrace or Recent alluvial deposits. Stratigraphically significant permeable zones within the Pleistocene deposits include the Pleistocene water table, the -40 MSL zone, the -60 MSL zone, the Intermediate Sand, and the 400-foot Aquifer, shown in Drawing 1-2. Permeable zones within the recent alluvial deposits of the Mississippi River include the Shallow Water Table (SWT) and Deep Water Table (DWT) and the semi-confined Alluvial Base (AB), shown in Figure 1-6.

Drawing 1-1. Disposal area and the adjacent Bayou Baton Rouge (BBR) area, original drawing number BK-99-151



Drawing 1-2. Cross Section LL-LL', original drawing number BK-99-1442

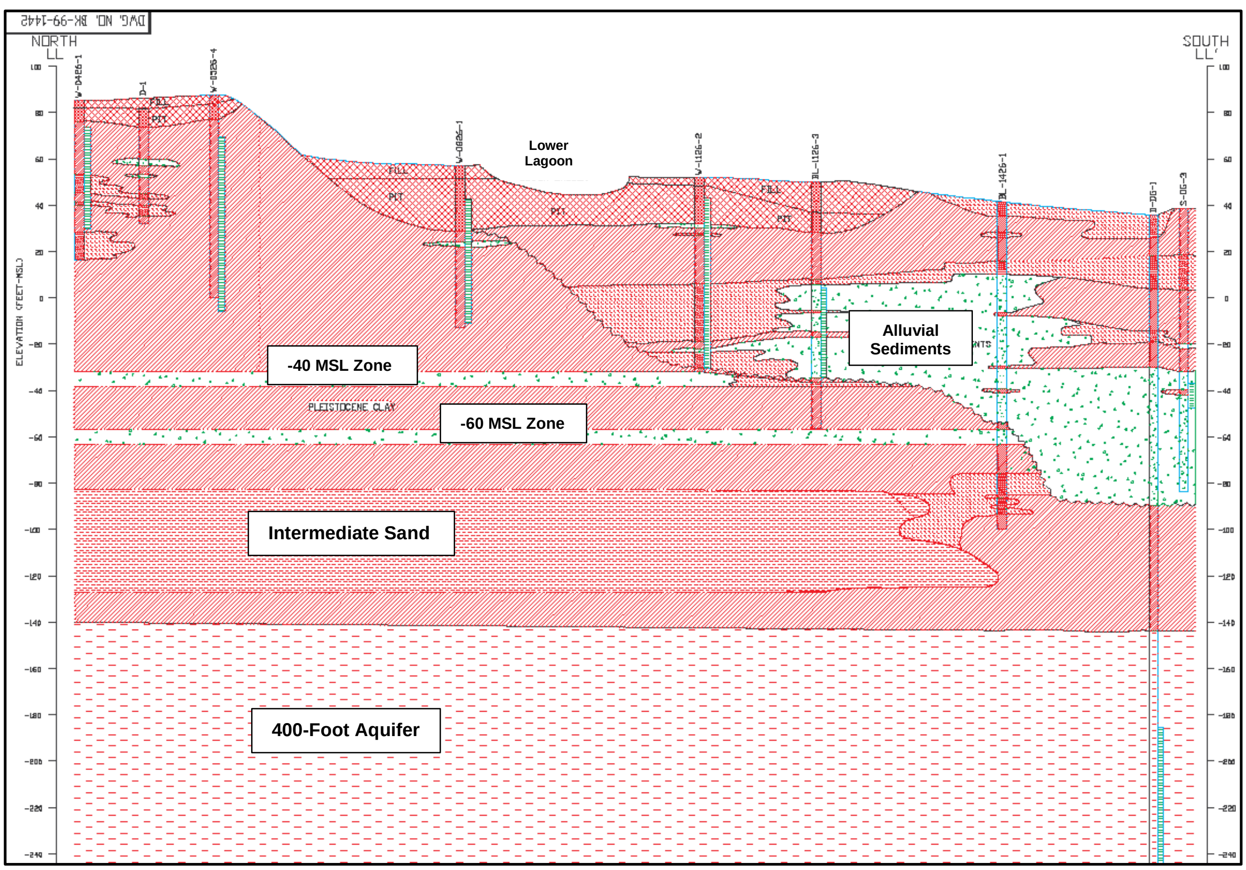
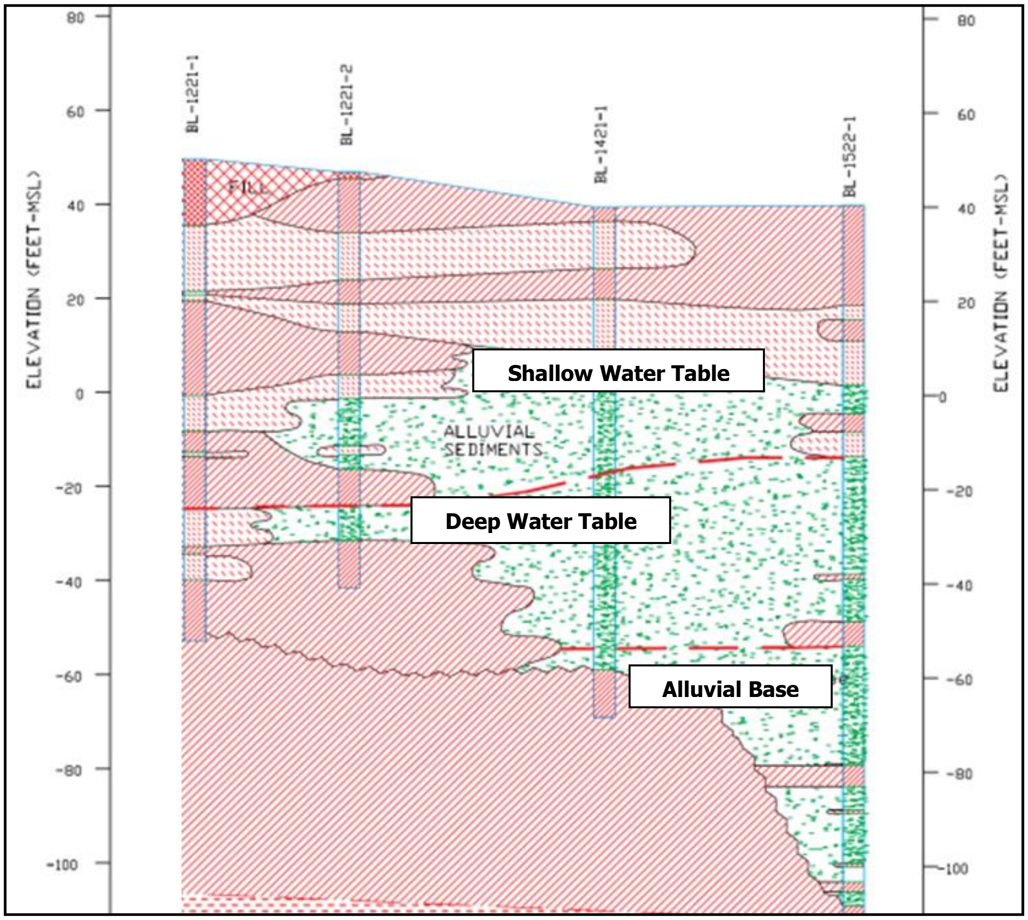


Figure 1-6. Delineation of SWT, DWT and AB ground water transport zones within the alluvial sediments south of the Brooklawn waste disposal area.



Note: Elevations are feet Mean Sea Level (MSL), ground water flow is from left to right, generally from north to south toward the Mississippi River.

BBR originates in the broad uplands, about six (6) miles north of the Scenic OU. The bayou crosses U.S. Highway 61 about one-fourth mile north of the Scenic OU, and flows southwest adjacent to the Scenic OU. The bayou turns near its confluence with Baker Canal, and flows west for about two (2) miles. The bayou then turns south and enters the Mississippi River floodplain, adjacent to the Brooklawn OU. The bayou and distributaries eventually discharge into the swampy lowlands of the Mississippi River floodplain. A significant channel in the BBR distributaries, the Middle Channel, has been filled to mitigate a potential surface material exposure pathway.

Land use in the vicinity of the PPI site consists of largely undeveloped areas in the bottomlands near the Mississippi River, with some industrial development in the upland areas and along U.S. Highway 61. An industrial district of Baton Rouge is located southeast of the site, in and around Scotlandville, LA.

Property exclusively owned by NPC at the Brooklawn OU is shown in Figure 1-7. The Brooklawn OU property includes a portion of Section 45, Township 5 South, Range 1 West, Greensburg Land District of Louisiana (Section 45) in East Baton Rouge Parish. Additional portions of Section 45 extend to the South and East of NPC's portion of Section 45. Throughout this report all references to the extent of the ground water plume in its current position results in no contaminant migration beyond the NPC property boundary. Furthermore, the actual extent, and the maximum modeled contaminant extent, remains upgradient of the approved Point of Compliance (POC) monitoring locations which are shown in Figure 1-8.

Figure 1-7. PPI Site, Brooklawn OU, property boundary and surrounding area

1.4 Objectives

The results presented in this addendum to the RPA report are based on the objectives appearing in Addendum J of the Work Plan dated June 29, 2012. The overall near-term objective of the Brooklawn Primary Transect (BPT) investigation was to investigate the extent of ground water COC in alluvial sediments south of the Brooklawn OU disposal area.

1.4.1 Work Plan Objectives

The objectives identified in Addendum J to the WP were as follows:

- Determine the extent of ground water COC in the alluvial sediments south of primary transect location P-1627-1.
- Replace ground water monitoring location PBB-1824-2, located within the DWT. This monitoring well has "silted-in" and is currently unusable.
- Selection of additional plume monitoring or sentry well locations in the zones designated as Deep Water Table or Alluvial Base, if necessary.

1.4.2 Goals and Remedial Objectives

The Consent Decree (CD) (US District Court, 1984), signed in Federal Court on February 16, 1984, outlined various remedial activities. As stated in the CD, the primary goal of the PPI Site remediation project is "to protect public health and the environment from releases of hazardous wastes, solid wastes, hazardous substances and pollutants and contaminants from the Brooklawn and Scenic Highway sites, by the investigation, development, design and implementation of remedial and long-term monitoring programs." The principal remedial objectives for the Brooklawn OU as presented in Addendum A to the Brooklawn RPA Report (NPC, 2001), Volume 4, Waste Processing and Risk Based Remedial Action, were to:

1) Identify potential contaminant pathways to human and ecological receptors.
2) Evaluate pathways and, if complete, quantify the risk.
3) Develop a remedial plan to reduce any unacceptable risks to levels that are protective of human health and the environment.
4) Develop a comprehensive Long Range Monitoring Plan to measure the efficacy of the remedial action.

The first two (2) remedial objectives listed above were completed with the submission and approval of Addendum A to the RPA Report (NPC, 2001). The risk based approach presented in the Brooklawn RPA Report concluded that two (2) exposure pathways required further action and investigation. These exposure pathways were: 1) surface materials in BBR sediments contaminated with Hexachlorobenzene and Hexachlorobutadiene immediately south of the Brooklawn OU, and, 2) ground water at the Brooklawn OU containing the COC listed in Table 1-1. The first exposure pathway, through surface materials, was identified based on a comprehensive Human Health Risk Assessment (HHRA) (EPA, 1999a) and Ecological Risk Assessment (ERA) (EPA, 1999b) conducted in Devil's Swamp. Both of these assessments concluded that only HCB and HCBD in crawfish produced a significant risk to human health. The second exposure pathway, through ground water at the Brooklawn OU, was evaluated using receptor modeling. Reactive Transport in 3 Dimensions (RT3D), a numerical transport model for simulation of advection, dispersion and chemical reactions of contaminants in ground water systems was used to determine if site contaminants would reach the downgradient Point of Exposure (POE), the Mississippi River.

Table 1-1. Ground water Contaminants of Concern for the PPI site, Brooklawn OU

Contaminants of Concern	**Maximum Contaminant Level[1] (µg/L)**
1,2-Dichloroethane (DCA)	5
cis-1,2-Dichloroethene (c-DCE)	70
trans-1,2-Dichloroethene (t-DCE)	100
1,1,2-Trichloroethane (TCA)	5
Trichloroethene (TCE)	5
1,1,2,2-Tetrachloroethane (TeCA)[2]	5
Tetrachloroethene (PCE)	5
Vinyl Chloride (VC)	2

Notes:

1. Maximum Contaminant Levels (MCL) are based on National Primary Drinking Water Regulations.
2. No established MCL or Life-time health advisory for TeCA is available.

The final two elements of the remedial objectives for the Brooklawn OU address the development of a Remedial Action (RA) plan that is protective of human health and the environment, and the development of a comprehensive monitoring plan to assess the efficacy of the selected RA.

The selected RA to mitigate risks associated with Hexachlorobenzene and Hexachlorobutadiene in the BBR distributaries was the placement of a protective fill in a distributary channel. The approved monitoring plan for this RA is:

1) For 20 years, inspection of the Bayou Baton Rouge fill material to assure continued conformance with performance requirements; and
2) For at least 3 years, collection and analysis of crawfish from the BBR Channels to assure the success of the RA.
(Note: This performance monitoring component has been completed as reported in the 2008 LTMP report for the Brooklawn OU, and received approval by the Agencies.)

The selected RA to mitigate risks associated with contaminated ground water at the Brooklawn OU is Monitored Natural Attenuation (MNA). The approved monitoring plan for this RA is:

1) For at least 30 years, monitoring the contaminant plume and geochemical parameters in the subsurface to evaluate the effectiveness of the natural attenuation process;
2) For at least 30 years, protect the identified downgradient Point of Exposure (POE) (the Mississippi River) through monitoring sentry POC wells for the appearance of site COC.

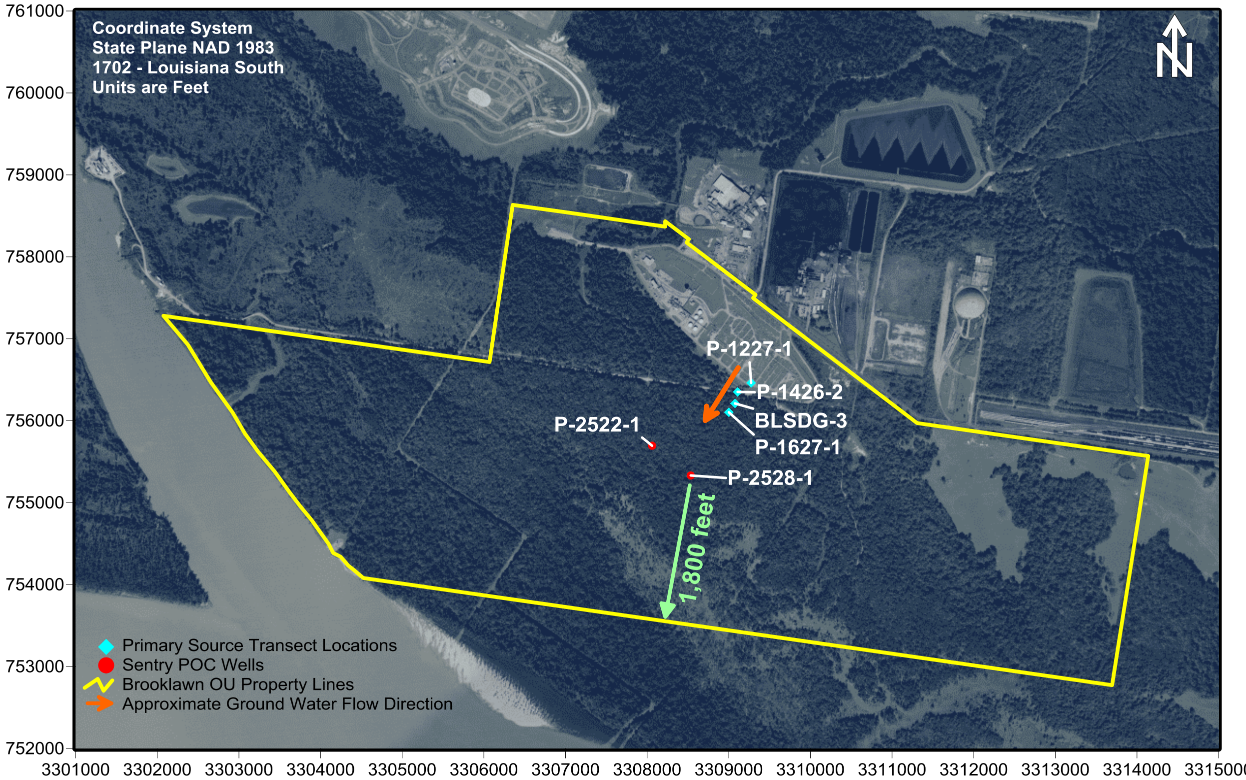
1.4.3 Approved Ground water Remedial Action

An update to the ground water exposure pathway was presented in Addendum F to the RPA Report (NPC, 2006) using the RT3D ground water model. DNAPL, the source of ground water COC, was also modeled in Addendum F using a three-dimension fate and transport mathematical model to provide source geometry, fate and transport information as an input to the ground water model. The ground water model demonstrated that dissolved COC would not migrate off NPC property and would not reach the Point of Exposure (POE), the Mississippi River. According to the model, NA at the Brooklawn OU will stabilize the dissolved contaminant plume before it migrates to the defined downgradient POE or beyond the property owned by NPC.

Simulation results from ground water predictions of contaminant transport were considered to be sufficient to support the decision to implement Monitored Natural Attenuation (MNA) as the selected RA for ground water contamination at the Brooklawn

OU. Additionally, two sentry wells were installed to act as heralds of COC migration to offsite receptors; POC locations are displayed in Figure 1-8.

Figure 1-8. Sentry Point of Compliance Wells Relative to Property Boundary



2.0 BROOKLAWN PRIMARY TRANSECT INVESTIGATION

2.1 Investigation Methods

Direct-push subsurface access methods were used to obtain the data necessary to conduct this investigation; these methods reduced investigation derived wastes and have resulted in minimal surface impact. Vertical COC concentration data at multiple depths at each location were collected using a GeoProbe® equipped with an SP-16 ground water sampler.

2.2 Data Collection

Ground water data from the alluvial sediments south of the Brooklawn disposal were collected in 2009, 2012, and 2013, during periods of usual low Mississippi River stage. Low river stage generally occurs between August and November and represents the annual period for maximum advective transport of COC along the BPT.

Prior to the sampling event conducted in 2012 there were two (2) consecutive years of unusual Mississippi River stages. During 2011, a near record high stage event occurred in May of 45 feet MSL. The following year the average Mississippi River stage after June 2012 was 5.5 feet MSL, near record minimum stage or maximum ground water transport along the BPT. NPC proposed continuing the investigation into 2013 to determine contaminant extent along the BPT in anticipation of conducting another work plan to update the ground water flow and transport model.

During 2009, vertical COC concentration data was collected from fifteen (15) locations using a GeoProbe® SP-16 ground water sampler from November 3, 2009, to November 6, 2009. Samples were collected from depths of 80 feet below ground surface (bgs) to 130 feet bgs; a total of seventy-five (75) samples were collected in 2009.

NPC conducted an expanded investigation at the locations previously identified in Figure 1-4 from October 8, 2012, to November 20, 2012. During the investigation 119 ground water samples were collected from depths ranging between 80 and 135 feet bgs. Data from the 2012 investigation was reported by letter to the Agencies on October 27, 2013. In that letter NPC requested approval to conduct sampling in 2013. During the 2013 investigation, 104 ground water samples were collected using a GeoProbe® SP-16 sampler from November 4, 2013, to November 8, 2013. Data from these investigations are presented in the following sections.

2.3 Investigation Results

Analytical laboratory reports are provided in Appendices B, C, and D for the years 2009, 2012, and 2013, respectively. Data tables for each sample location and sample depth are presented in Appendices F and G for 2012 and 2013, respectively. Tables and figures presented in this section use reduced data derived from the BPT investigation.

Locations that were sampled as part of Addendum J to the WP are displayed in Figure 2-1. During 2012, the investigation was initiated at location B08 and moved west toward location B15. Significant concentrations of COC were not detected along the B08-B15 "line". Therefore, NPC requested and received approval to test additional upgradient locations show in Figure 2-1 in an attempt to detect the leading edge of the solute plume.

Figure 2-1. Geoprobe® sample points for all BPT ground water investigations. Legend shows originally approved locations and additional sampling locations.

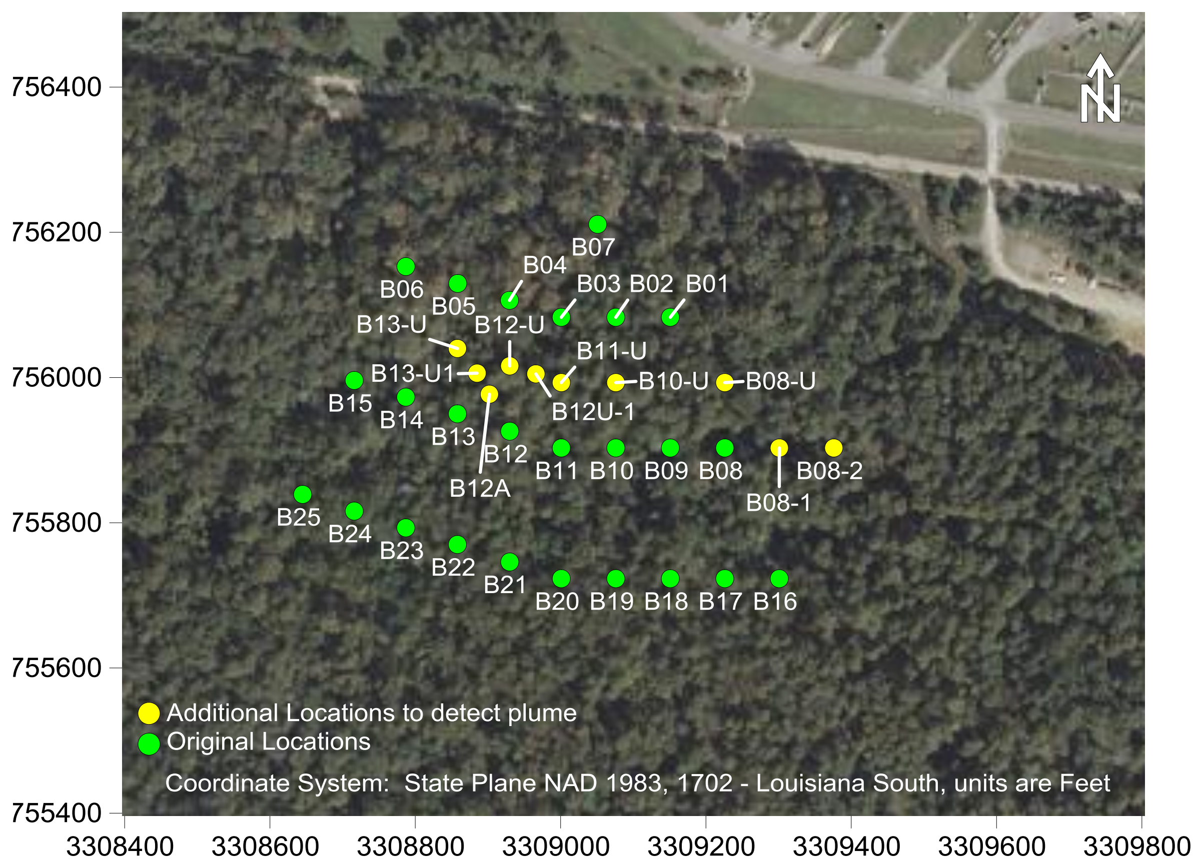


Figure 2-2. Geoprobe® sample points for all BPT ground water investigations. Legend shows locations where COC values exceeded MCL values.

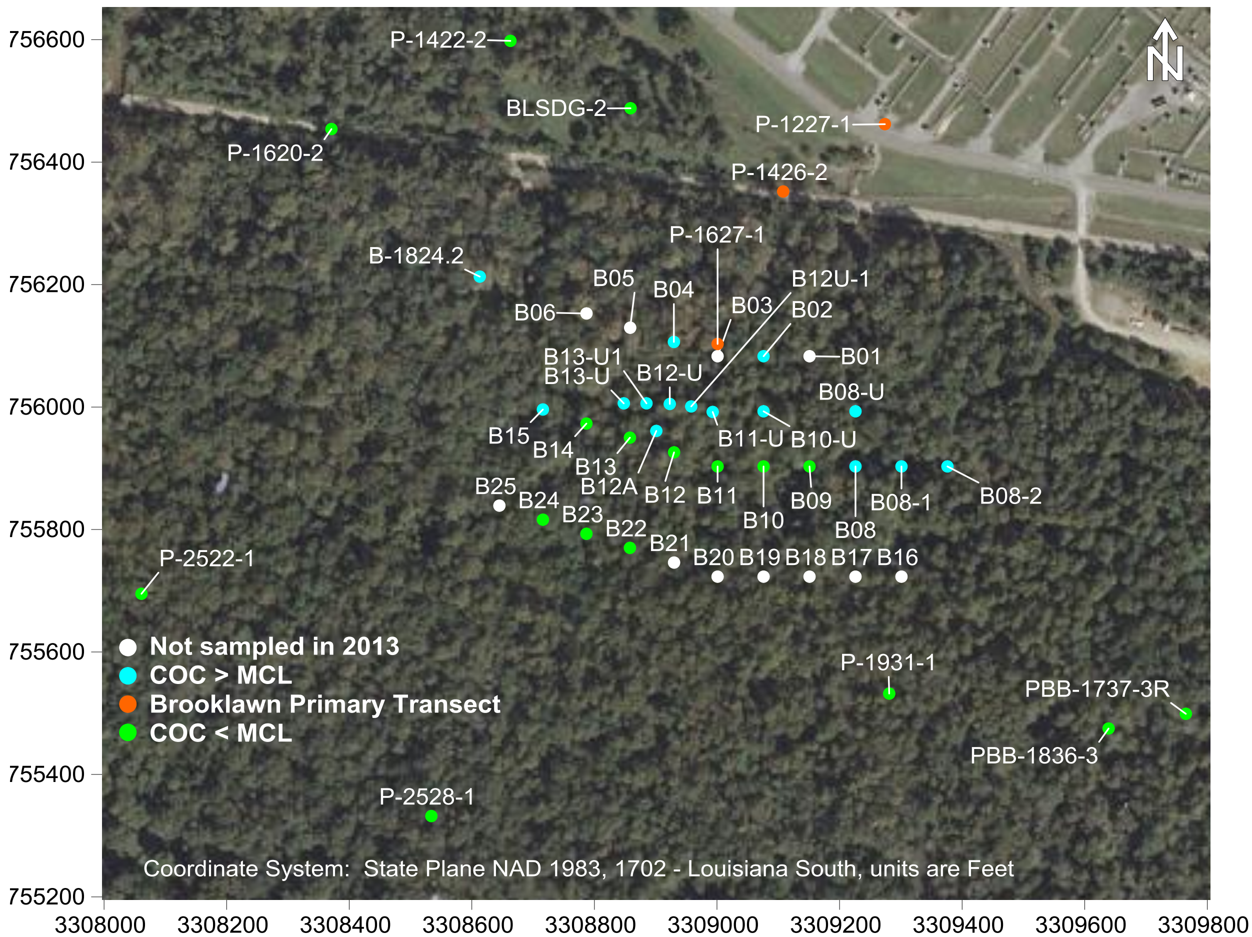


Table 2-1 lists the locations with their coordinates that were sampled each year. In addition to the extra locations upgradient of the B08-B15 sample line, sample locations were added east and upgradient of B08 as shown in Figure 2-1. These locations were added when results from B08 showed the highest VC concentration in 2009, 76 µg/L, on the B08-B15 line as shown in Table 2-2. Figure 2-2 depicts the BPT sample locations, the Brooklawn Primary Transect monitoring wells and monitoring wells included in annual LTMP reporting.

Table 2-1. Direct push BPT locations sampled by year; showing location coordinates and date sampled.

Locations Sampled in 2009				
Location ID	Year	Date Sampled	East	North
B01	2009	11/04/2009	3,309,151	756,083
B02	2009	11/03/2009	3,309,076	756,083
B03	2009	11/03/2009	3,309,001	756,083
B04	2009	11/04/2009	3,308,930	756,106
B05	2009	11/04/2009	3,308,858	756,130
B06	2009	11/04/2009	3,308,787	756,153
B07	2009	08/26/2009	3,309,051	756,211
B08	2009	11/04/2009	3,309,226	755,903
B08	2009	11/05/2009	3,309,226	755,903
B09	2009	11/05/2009	3,309,151	755,903
B10	2009	11/05/2009	3,309,076	755,903
B11	2009	11/05/2009	3,309,001	755,903
B12	2009	11/05/2009	3,308,930	755,926
B13	2009	11/06/2009	3,308,858	755,950
B14	2009	11/06/2009	3,308,787	755,973
B15	2009	11/06/2009	3,308,716	755,996

Locations Sampled in 2012				
Location ID	Year	Date Sampled	East	North
B08	2012	10/08/2012	3,309,226	755,903
B08-1	2012	10/29/2012	3,309,301	755,903
B08-2	2012	10/30/2012	3,309,376	755,903
B08-U	2012	11/20/2012	3,309,226	755,993
B09	2012	10/09/2012	3,309,151	755,903
B10	2012	10/09/2012	3,309,076	755,903
B10-U	2012	11/20/2012	3,309,076	755,993
B11	2012	10/09/2012	3,309,001	755,903
B11-U	2012	10/30/2012	3,308,993	755,992
B12	2012	10/10/2012	3,308,930	755,926
B12A	2012	11/19/2012	3,308,901	755,961
B12-U	2012	10/30/2012	3,308,923	756,005
B12U-1	2012	11/19/2012	3,308,958	756,001
B13	2012	10/10/2012	3,308,858	755,950
B13-U	2012	11/20/2012	3,308,848	756,006
B13-U1	2012	11/19/2012	3,308,885	756,006
B14	2012	10/10/2012	3,308,787	755,973
B15	2012	10/11/2012	3,308,716	755,996
B-1824.2	2012	10/11/2012	3,308,613	756,213

Locations Sampled in 2013				
Location ID	Year	Date Sampled	East	North
B02	2013	11/08/2013	3,309,076	756,083
B04	2013	11/08/2013	3,308,930	756,106
B08	2013	11/08/2013	3,309,226	755,903
B08-1	2013	11/08/2013	3,309,301	755,903
B08-2	2013	11/07/2013	3,309,376	755,903
B08-U	2013	11/07/2013	3,309,226	755,993
B09	2013	11/07/2013	3,309,151	755,903
B10	2013	11/07/2013	3,309,076	755,903
B10-U	2013	11/07/2013	3,309,076	755,993
B11	2013	11/04/2013	3,309,001	755,903
B11-U	2013	11/04/2013	3,308,993	755,992
B12	2013	11/04/2013	3,308,930	755,926
B12A	2013	11/05/2013	3,308,901	755,961
B12-U	2013	11/05/2013	3,308,923	756,005
B12U-1	2013	11/05/2013	3,308,958	756,001
B13	2013	11/05/2013	3,308,858	755,950
B13-U	2013	11/05/2013	3,308,848	756,006
B13-U1	2013	11/05/2013	3,308,885	756,006
B14	2013	11/06/2013	3,308,787	755,973
B15	2013	11/06/2013	3,308,716	755,996
B22	2013	11/06/2013	3,308,858	755,770
B23	2013	11/06/2013	3,308,787	755,793
B24	2013	11/06/2013	3,308,716	755,816

Contaminant contour data is presented in the following figures. Figure 2-3 displays the estimated extent of vinyl chloride in the alluvial sediments in 2009. Data used to generate the contours for the 2009 sampling event are presented in Table 2-2. Contours generated from the 2012 investigation are showed in Figures 2-4, 2-5, and 2-6 for VC, DCA, and TCA, respectively. Data used to generate the contours for the 2012 sampling event are presented in Table 2-3.

Figure 2-3. Estimated aerial extent of VC within the alluvial sediments in 2009

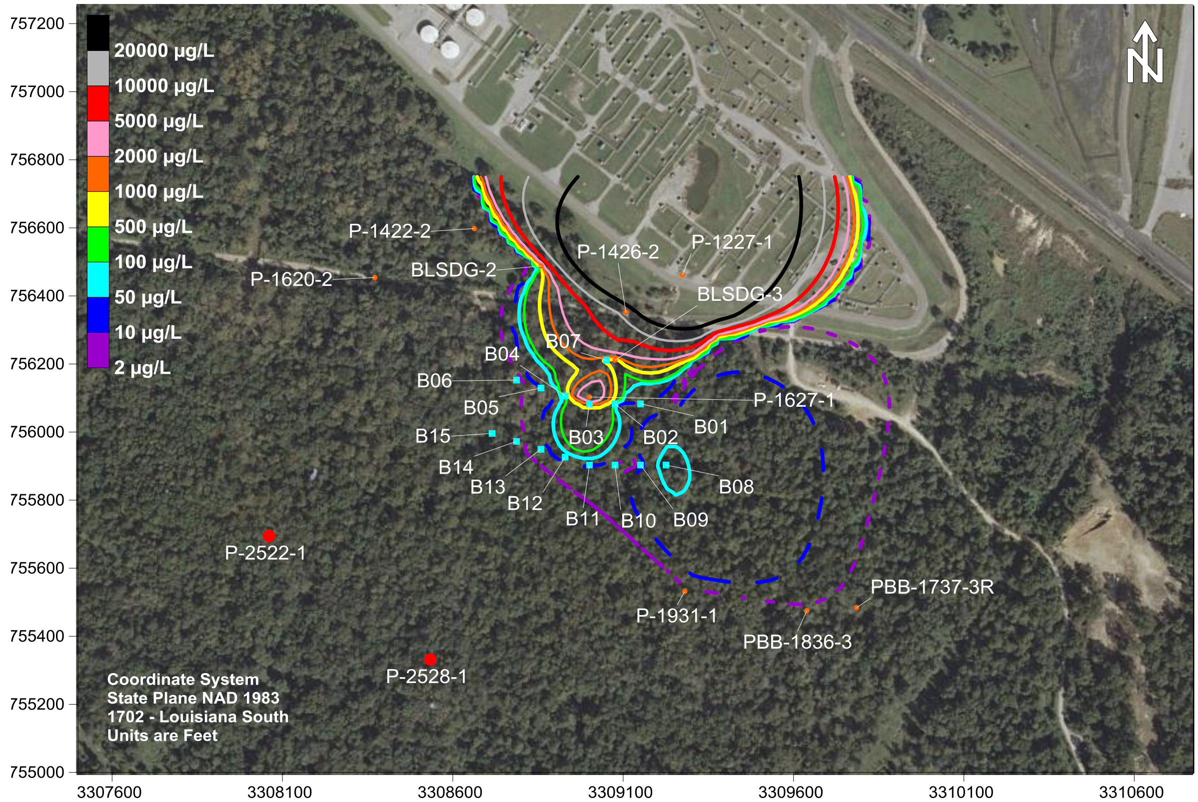


Table 2-2. Maximum COC values from the 2009 sampling event; the values represent the maximum concentrations throughout the entire sampling depth for each location.

Location ID	Coordinates		Maximum Contaminants of Concern Concentrations, µg/L							
	East	North	PCE	TCE	TeCA	TCA	DCA	c-DCE	t-DCE	VC
B01	3,309,151	756,083	1	1	1	5.03	3.55	1	1	6.28
B02	3,309,076	756,083	1	1	1	1	1	1	1	4.94
B03	3,309,001	756,083	10	13	10	1240	783	10	10	580
B04	3,308,930	756,106	1	1	1	1.29	1.56	1	1	7.63
B05	3,308,858	756,130	1	1	1	1	1	1	1	6.23
B06	3,308,787	756,153	1	1	1	1	1	1	1	1
B07	3,309,051	756,211	10	10	10	10	10	5	10	279
B08	3,309,226	755,903	2	2	2	2	2	2.4	2	75.9
B09	3,309,151	755,903	1	1	1	1	1	1	1	1
B10	3,309,076	755,903	1	1	1	1	1	1	1	1.12
B11	3,309,001	755,903	1	1	1	1	1	1	1	7.15
B12	3,308,930	755,926	1	1	1	1	1	1	1	17.8
B13	3,308,858	755,950	1	1	1	1	1	1	1	5.26
B14	3,308,787	755,973	1	1	1	1	1	1	1	1
B15	3,308,716	755,996	1	1	1	1	1	1	1	1

Figure 2-4. Estimated aerial extent of VC within the alluvial sediments in 2012

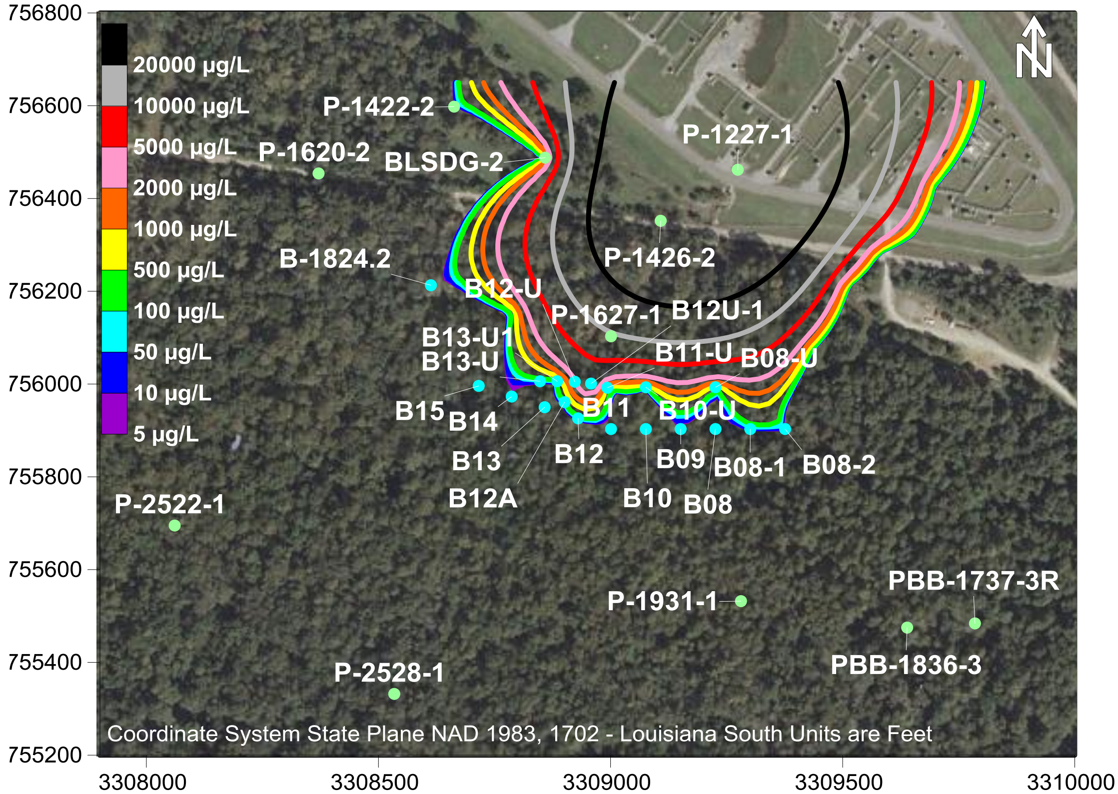


Figure 2-5. Estimated aerial extent of DCA within the alluvial sediments in 2012

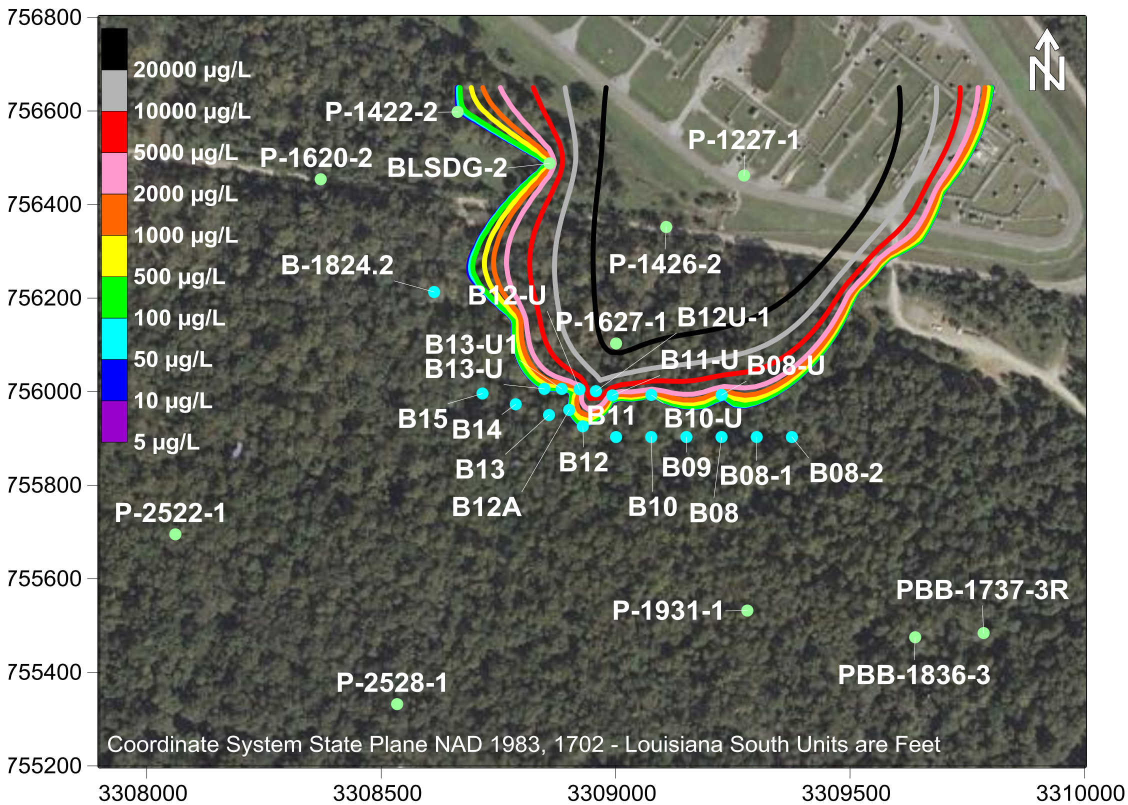


Figure 2-6. Estimated aerial extent of TCA within the alluvial sediments in 2012

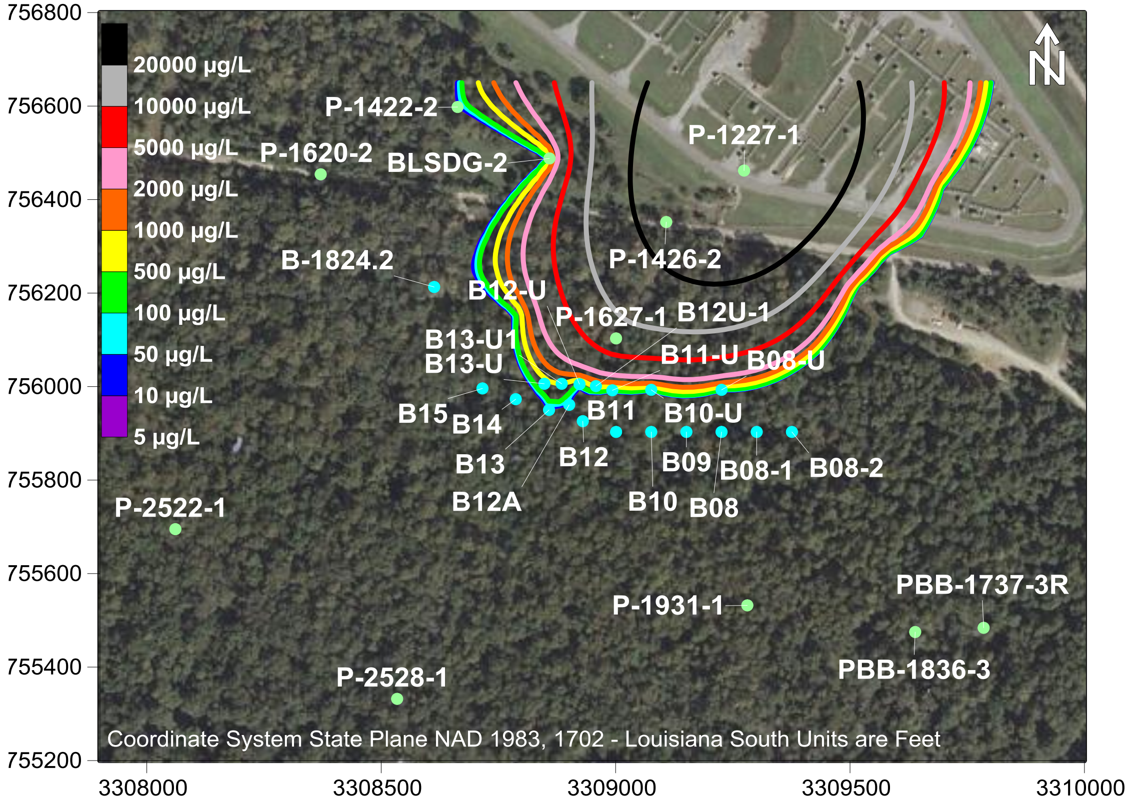


Table 2-3. Maximum COC values from the 2012 sampling event; the values represent the maximum concentrations throughout the entire sampling depth for each location.

Location ID	Coordinates		Maximum Contaminants of Concern Concentrations, µg/L							
	East	North	PCE	TCE	TeCA	TCA	DCA	c-DCE	t-DCE	VC
B08	3,309,226	755,903	2	2	2	2	1.08	2	2	27.1
B08-1	3,309,301	755,903	1	1	1	1	1	1	1	16.9
B08-2	3,309,376	755,903	1	1	1	1	1	1	1	1.42
B08-U	3,309,226	755,993	5	5	5	5	5	5	5	355
B09	3,309,151	755,903	1	1	1	1	1	1	1	1
B10	3,309,076	755,903	1	1	1	1	1	1	1	4.49
B10-U	3,309,076	755,993	1	1	1	1	1	1	1	1
B11	3,309,001	755,903	1	1	1	1	1	1	1	1
B11-U	3,308,993	755,992	1	1	1	1	1	1	1	1
B12	3,308,930	755,926	1	1	1	1	1	1	1	7.06
B12A	3,308,901	755,961	1	1	1	1	2.55	1	1	19
B12-U	3,308,923	756,005	20	20	20	20	171	22.4	20	1,730
B12U-1	3,308,958	756,001	100	100	100	571	10,100	370	100	4,410
B13	3,308,858	755,950	1	1	1	1	1.13	1	1	1
B13-U	3,308,848	756,006	1	1	1	1	1.96	1	1	5.73
B13-U1	3,308,885	756,006	1	1	1	1	2.71	1	1	4.13
B14	3,308,787	755,973	1	1	1	1	1	1	1	2.1
B15	3,308,716	755,996	1	1	1	1	1	1	1	1.83
B-1824.2	3,308,613	756,213	1	1	1	1	1	1	1	15.1
FIELD BLANK	N/A	N/A	1	1	1	1	1	1	1	1
TRIP BLANK	N/A	N/A	1	1	1	1	1	1	1	1

Contours generated from the 2013 investigation are showed in Figures 2-7, 2-8, and 2-9 for VC, DCA, and TCA, respectively. Data used to generate the contours for the 2013 sampling event are presented in Table 2-4.

Figure 2-7. Estimated aerial extent of VC within the alluvial sediments in 2013

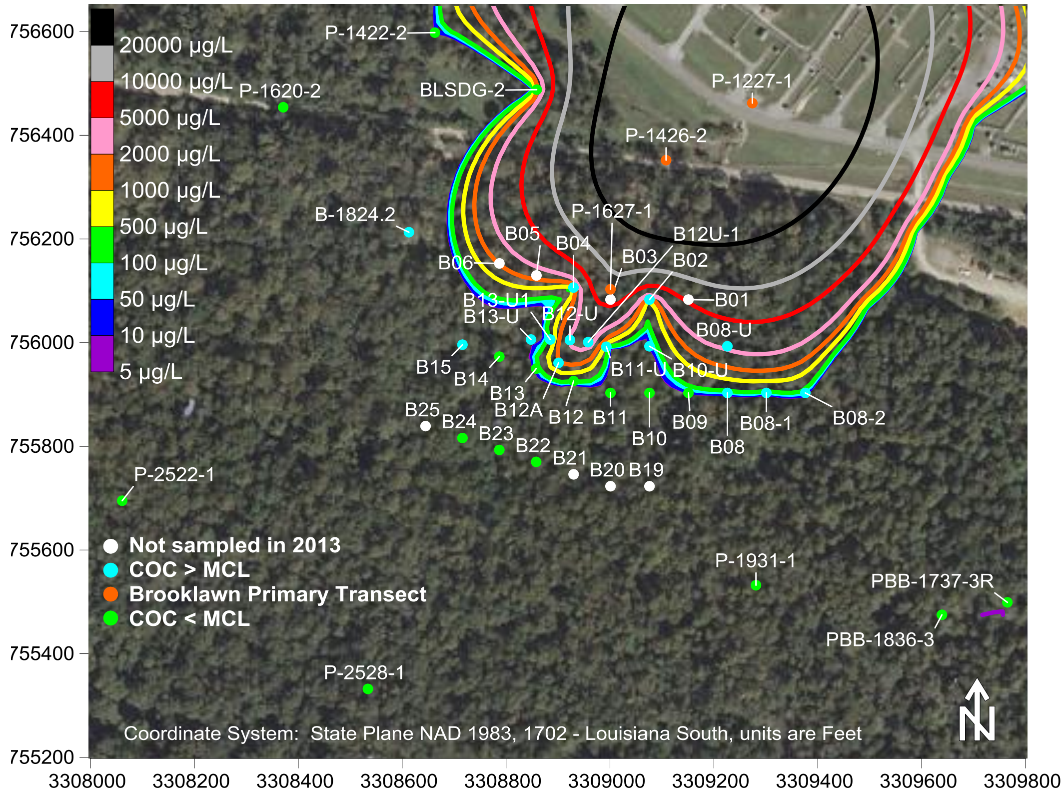


Figure 2-8. Estimated aerial extent of DCA within the alluvial sediments in 2013

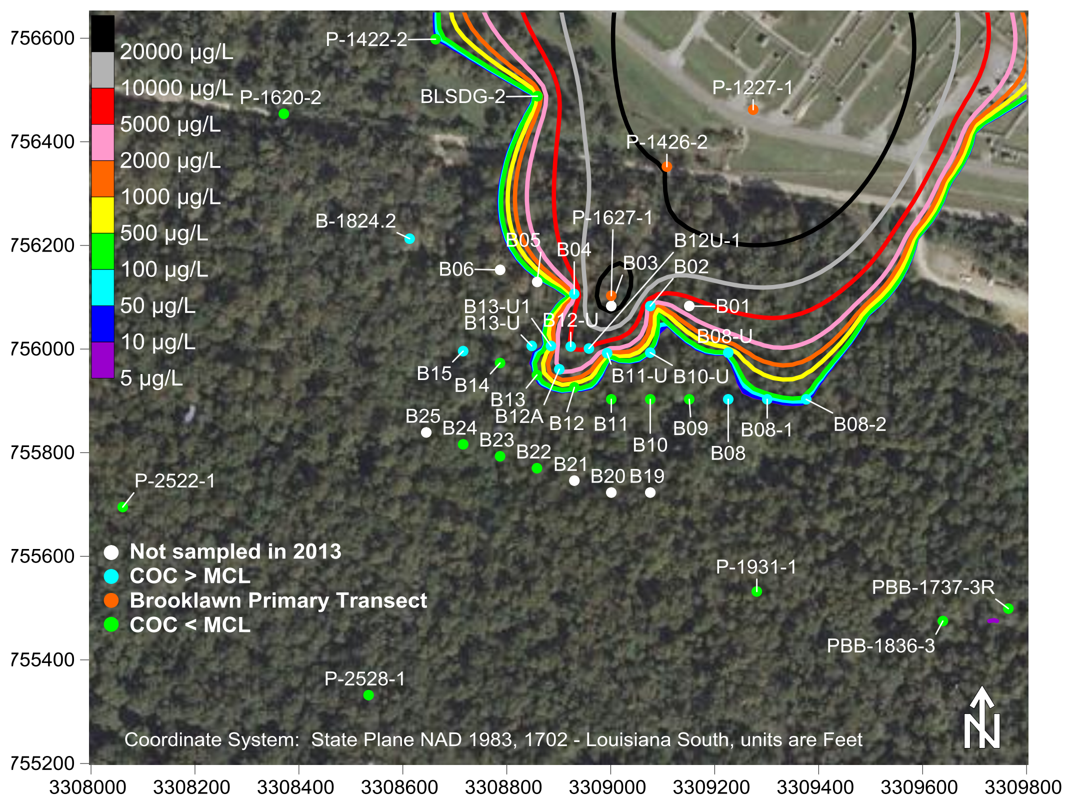


Figure 2-9. Estimated aerial extent of TCA within the alluvial sediments in 2013

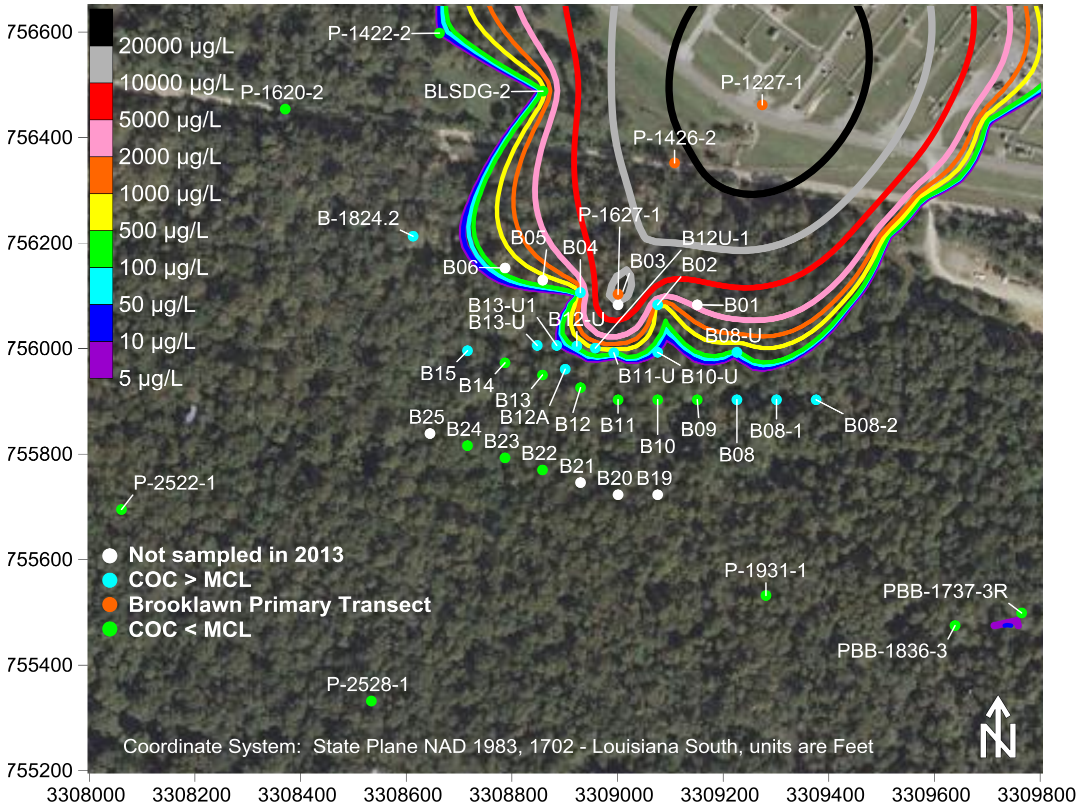
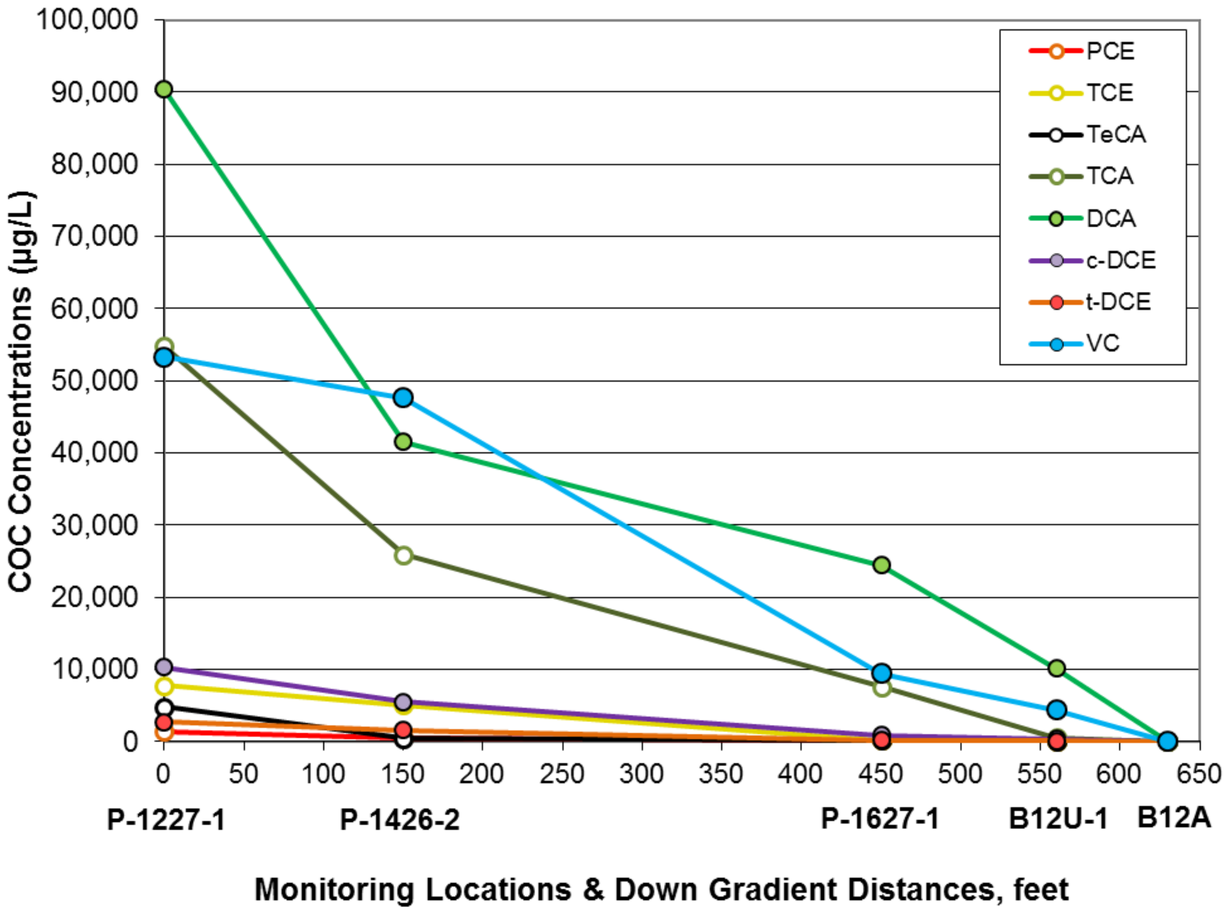


Table 2-4. Maximum COC values from the 2013 sampling event.

Location ID	Coordinates		Maximum Contaminant of Concern Concentrations, µg/L							
	East	North	PCE	TCE	TeCA	TCA	DCA	c-DCE	t-DCE	VC
B02	3,309,076	756,083	1	1	1	1	2.97	1	1	1.09
B04	3,308,930	756,106	1	1	1	1	36.5	1	1	26.1
B08	3,309,226	755,903	5	5	5	5	5	5	5	17
B08-1	3,309,301	755,903	1	1	1	1	1	1	1	11.1
B08-2	3,309,376	755,903	1	1	1	1	83.8	1	1	61.9
B08-U	3,309,226	755,993	20	20	20	20	20	20	20	2,210
B09	3,309,151	755,903	1	1	1	1	1	1	1	0.71
B10	3,309,076	755,903	1	1	1	1	1	1	1	1
B10-U	3,309,076	755,993	1	1	1	1	1	1	1	3.29
B11	3,309,001	755,903	1	1	1	1	1	1	1	1.65
B11-U	3,308,993	755,992	1	1	1	1	13.8	1	1	32.5
B12	3,308,930	755,926	1	1	1	1	1	1	1	1
B12A	3,308,901	755,961	20	20	20	20	2,360	20	20	1,060
B12-U	3,308,923	756,005	100	100	100	54.2	5,630	65.6	100	2,210
B12U-1	3,308,958	756,001	100	100	100	406	4,970	149	100	2,740
B13	3,308,858	755,950	1	1	1	1	1	1	1	1
B13-U	3,308,848	756,006	1	1	1	1	1.79	1	1	3.71
B13-U1	3,308,885	756,006	1	1	1	1	1.44	1	1	3.32
B14	3,308,787	755,973	1	1	1	1	1	1	1	1.73
B15	3,308,716	755,996	1	1	1	1	1	1	1	2.01
B22	3,308,858	755,770	1	1	1	1	1	1	1	1
B23	3,308,787	755,793	1	1	1	1	1	1	1	1
B24	3,308,716	755,816	1	1	1	1	1	1	1	1
FIELD BLANK	N/A	N/A	1	1	1	1	1	1	1	1
TRIP BLANK	N/A	N/A	1	1	1	1	1	1	1	1

Downgradient transect tend data for the 2012 and 2013 sampling events are displayed in Figure 2-10 and Figure 2-11, respectively.

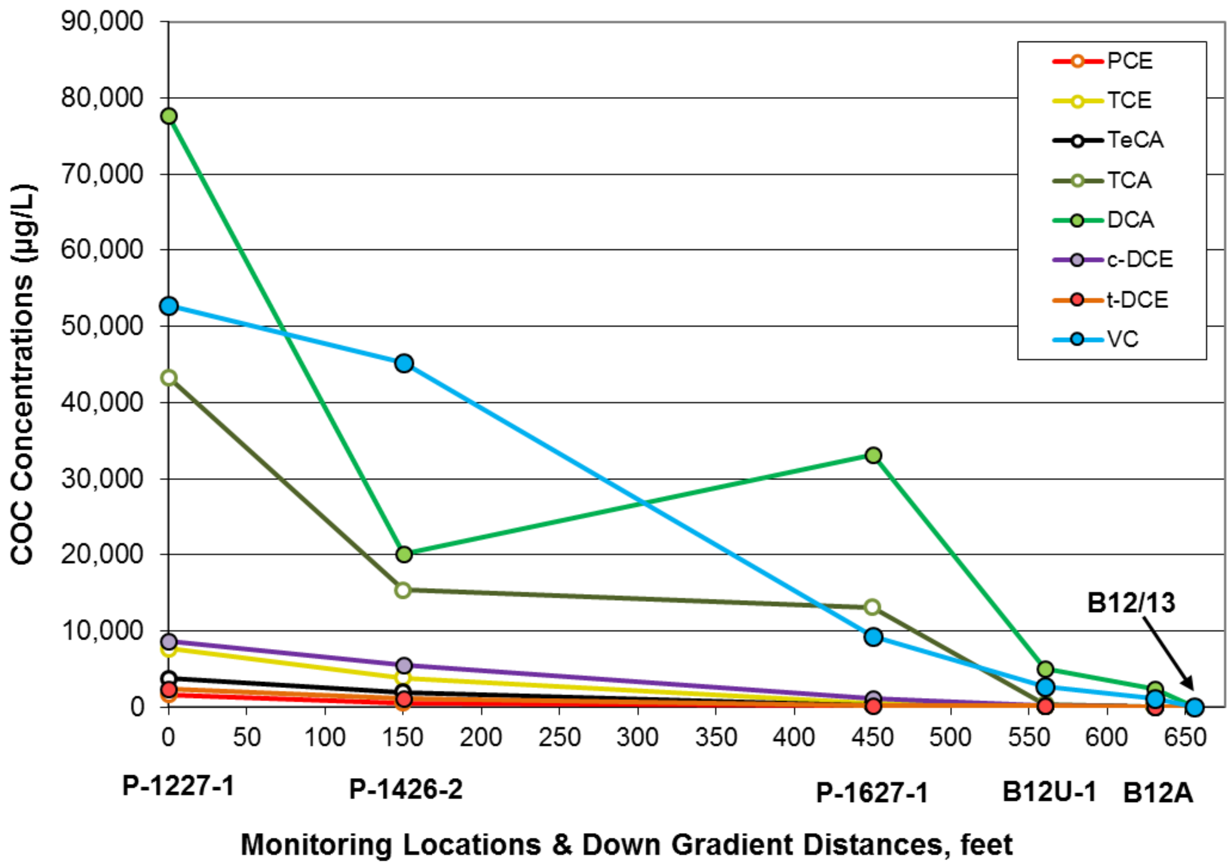
Figure 2-10. Brooklawn Primary Transect trend data for the 2012 sampling event; the included table presents data from the BPT investigation and annual monitoring well sampling.



Sample Date	Location ID	Down gradient Distance	PCE	TCE	TeCA	TCA	DCA	c-DCE	t-DCE	VC
09/24/2012	P-1227-1	0	1,420	7,750	4,780	54,800	90,400	10,300	2,720	53,300
09/18/2012	P-1426-2	150	500	5,050	435	25,900	41,500	5,520	1,620	47,600
09/24/2012	P-1627-1	450	200	214	200	7,650	24,450	920	200	9,450
11/19/2012	B12U-1	560	100	100	100	571	10,100	370	100	4,410
11/19/2012	B12A	630	1	1	1	1	3	1	1	19

COC data from the 2012 investigation confirmed that the extent of contamination for VC reached location B12A, approximately 180 feet downgradient of the primary transect monitoring location P-1627-1. Estimates of ground water contaminant transport velocity can be calculated using the length of time between when contaminants first appeared in monitoring well P-1627-1, December 6, 2007, and when contaminants were detected at BPT location B12A, November 19, 2012, and the distance between the two locations. The resulting contaminant transport velocity for the approximate 6 years to travel 180 feet is 30 feet/year. This can similarly be estimated using the data collected in 2013. Concentrations increased at BPT location B12A, however locations B-12 and B-13, located approximately 45 feet downgradient of B12A, remained absent of all ground water COC; see Figure 2-11 and Table 2-4. Indicating that contaminant transport is less than 45 feet/year.

Figure 2-11. Brooklawn Primary Transect trend data for the 2013 sampling event; the included table presents data from the BPT investigation and annual monitoring well sampling.

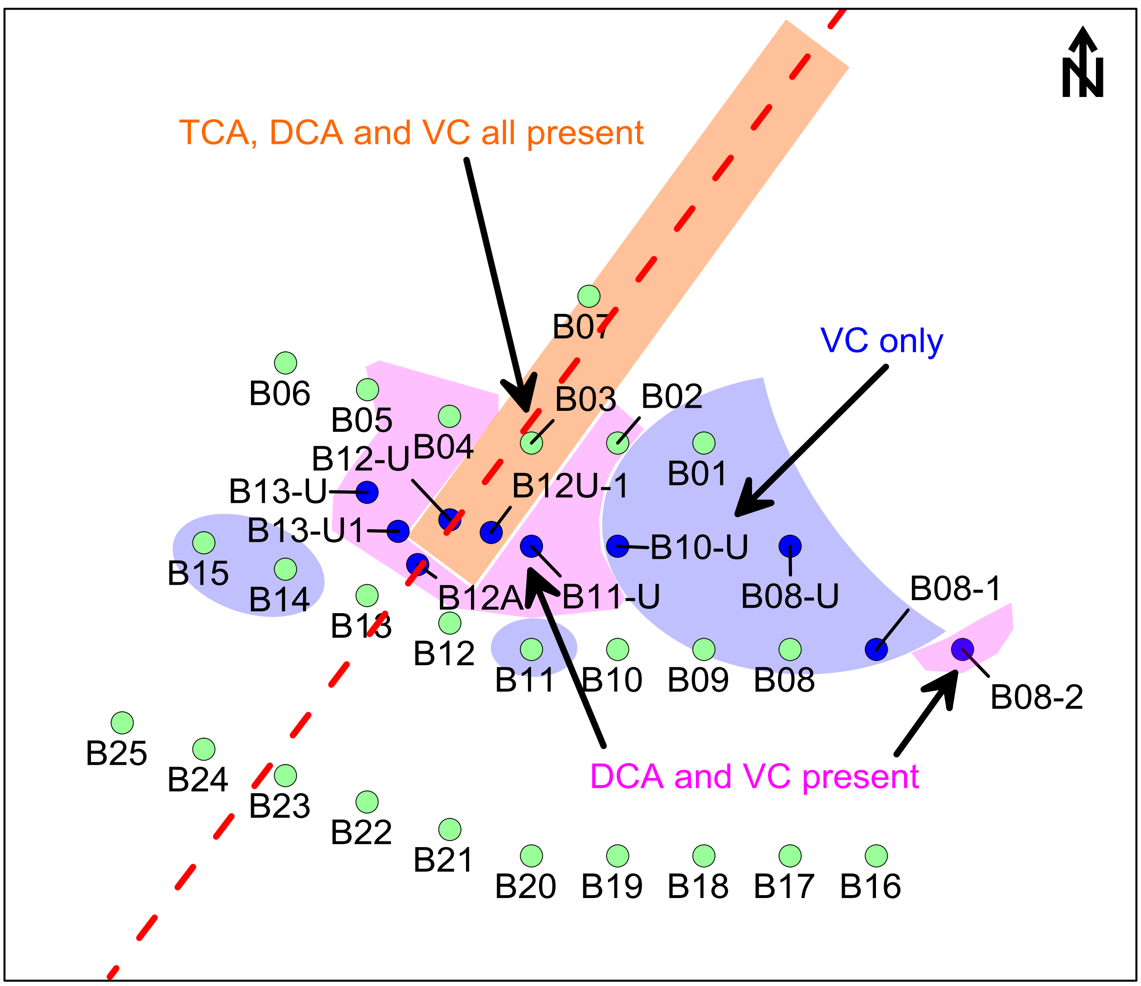


Sample Date	Location ID	Down gradient Distance	PCE	TCE	TeCA	TCA	DCA	c-DCE	t-DCE	VC
11/11/2013	P-1227-1	0	1,640	7,650	3,710	43,300	77,700	8,610	2,370	52,700
11/11/2013	P-1426-2	150	494	3,840	1,940	15,400	20,100	5,550	1,080	45,200
10/22/2013	P-1627-1	450	200	438	200	13,100	33,100	1,070	200	9,330
11/05/2013	B12U-1	560	100	100	100	406	4,970	149	100	2,740
11/05/2013	B12A	630	20	20	20	20	2,360	20	20	1,060
11/05/2013	B12/13	655	1	1	1	1	1	1	1	1

Applying the contaminant transport velocity to calculate the length of time to potentially impact downgradient locations shows the following: the POC monitoring wells, 700 feet downgradient, are potentially impacted in approximately 24 years, and the estimated arrival time through alluvial sediments to the NPC property line, 2,500 feet downgradient, is 84 years. Impact at each of these locations may not occur provided natural attenuation processes limit contaminant transport. Future investigations are planned to evaluate current contaminant concentration trends with respect to performance of the approved MNA remedial action.

The primary ground water COC that are transported downgradient along the BPT are TCA, DCA, and VC. Ground water sampling in 2013 showed that VC exhibited the greatest horizontal extent along the BPT. A single location B08-2, east of the monitoring well transect, showed concentrations of both DCA and VC above their MCLs. A conceptual representation of the downgradient extent of contamination is shown in Figure 2-12.

Figure 2-12. Conceptual representation of predominant TCA, DCA and VC contaminant zones in the BPT alluvial sediments; the dashed line represents the monitoring well primary transect.



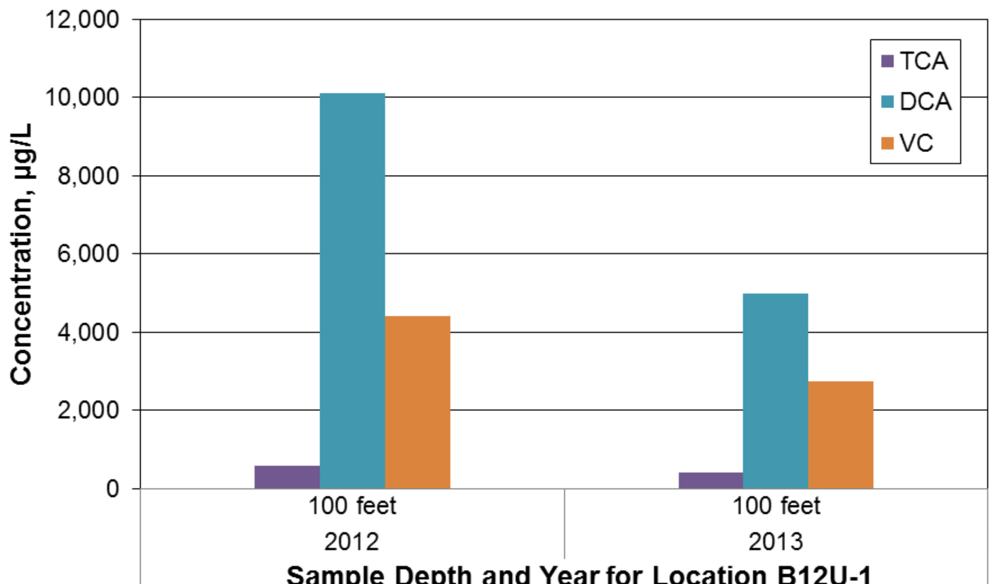
3.0 SUMMARY AND CONCLUSIONS

3.1 BPT Investigation

The primary objective of the BPT investigation was to locate the downgradient extent of ground water COC within the alluvial sediments south of the former disposal area. Details of this investigation are presented in Section 2.0; based on the data collected this WP objective was successfully completed. Figures 2-10 and 2-11 with the contour figures estimating aerial contaminant concentrations show the downgradient extent of COC along the BPT based on the 2012 and 2013 dataset. Since the installation of primary transect monitoring location P-1627-1 in 2007, COC have migrated near locations B12 and B13.

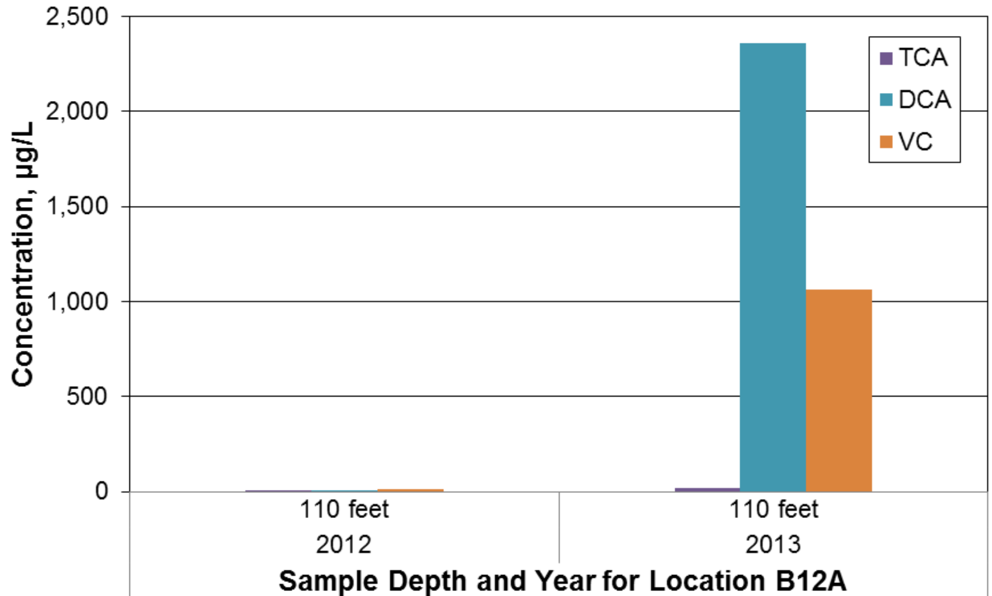
Data was collected in succeeding years due to an atypically low Mississippi river stage during 2012. Figure 3-1 shows ground water data for TCA, DCA and VC at 100 feet bgs for year 2012 and 2013. The figure shows lower DCA and VC concentrations at location B12U-1 in 2013 when the river stage was more typical. However, during the 2013 investigation, concentrations of DCA and VC did increase at BPT location B12A.

Figure 3-1. Concentration data at location B12U-1 for each year at 100 feet bgs



	100 feet 2012	100 feet 2013
TCA	571	406
DCA	10100	4970
VC	4410	2740

Figure 3-2. Concentration data at location B12A for each year at 110 feet bgs



	110 feet 2012	110 feet 2013
TCA	1	20
DCA	1	2360
VC	14.7	1060

Figure 3-2 shows the increase in COC concentrations at location B12A from 2012 to 2013. This investigation was initiated based on increasing concentrations along the BPT. The data obtained has provided an estimate of contaminant transport which is useful in determining the potential time to impact downgradient locations. These estimates were presented in Section 2.2 and show that any potential impact to the POC monitoring locations or the defined POE, the Mississippi River, is not imminent. Therefore, sufficient time is available to continue to monitor groundwater within the alluvial sediments while conducting additional investigations. NPC plans to install a monitoring well at location B23, estimated to be potentially impacted in approximately 6 years. Additional monitoring wells, investigations by Louisiana State University, and an update to the ground water flow and solute transport models are planned as described in the following section.

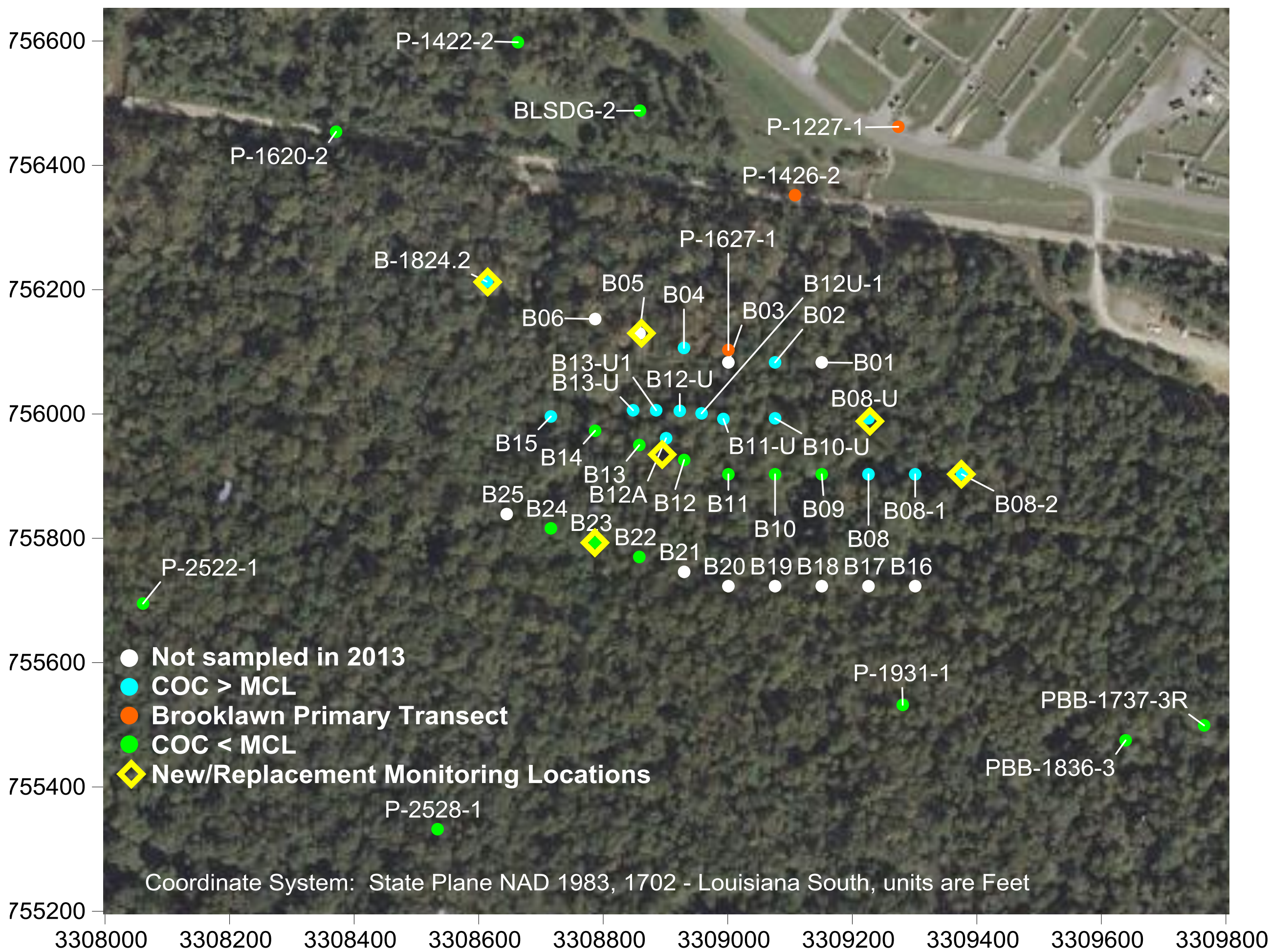
3.2 Future Investigations

3.2.1 Monitoring Well Installations

Replacement of monitoring well PBB-1824-2 and the installation of several additional monitoring wells downgradient and lateral of the BPT are planned to collect groundwater data for inclusion in the updated solute transport model. As indicated in

Section 3.1, NPC plans on installing a monitoring well at location B23, currently not impacted by COC. Additional monitoring locations being considered are presented in Figure 3-3. The locations of these monitoring wells will be finalized in a forthcoming Work Plan which will specify the anticipated depths of the screened interval. Presently, five (5) monitoring locations are being considered in addition to the replacement well for PBB-1824-2. This will provide additional groundwater data lateral and downgradient of the BPT.

Figure 3-3. Potential locations for additional monitoring wells lateral and downgradient of the BPT shown with a lozenge marker

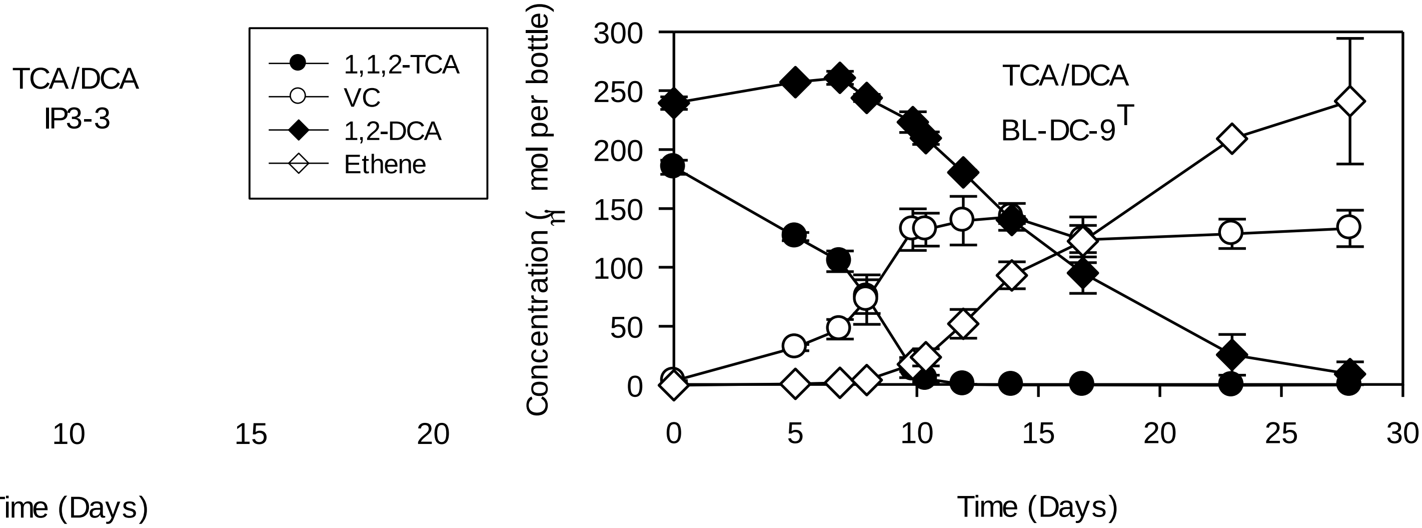


3.2.2 Dehalogenation of Chlorinated Alkane Mixtures

Recent work using microbial species isolated from the Brooklawn OU provide a potential explanation for the increasing concentrations along the BPT. This investigation focused on the anaerobic reductive dechalogenation of chlorinated alkane mixtures. Dr.

William Moe, who has provided ongoing support for the PPI remediation project, recently published a paper (Dillehay, Bowman, Yan, Rainey, & Moe, 2014) which provides insight related to the interactions of TCA and DCA in mixtures. The paper is provided in Appendix E. The research showed that the Dehalogenimonas species, D. lykanthroporepellens, isolated from the Brooklawn OU, consistently dechlorinated TCA prior to DCA in binary mixtures. The mechanism for the preferential reduction of TCA over DCA is not fully understood. It is perhaps advantageous to the bacteria based on the energy exchanged or toxicity effects. However, the presence of TCA has been established to be inhibitory to the concurrent dechlorination of DCA. Data presented from the mixtures analysis revealed that the dehalogenation of TCA and DCA in mixtures is sequential, with TCA reduction to VC preceding the reduction of DCA to ethene. Figure 3-4, taken from the mixtures research, shows the binary mixture of TCA and DCA with no appreciable production of ethene (reduction of DCA) until TCA concentrations are low as indicated by an increase in VC concentrations. This finding is particularly helpful in understanding the downgradient transport of TCA, DCA and VC along the BPT. Concentrations of TCA in the Brooklawn OU source area are relatively high as shown in Figure 2-10 and 2-11. These figures also show that DCA, which is present at higher source concentrations than TCA, reduces rapidly when TCA becomes depleted. LSU is continuing this work for incorporation into the updated groundwater flow and solute transport model.

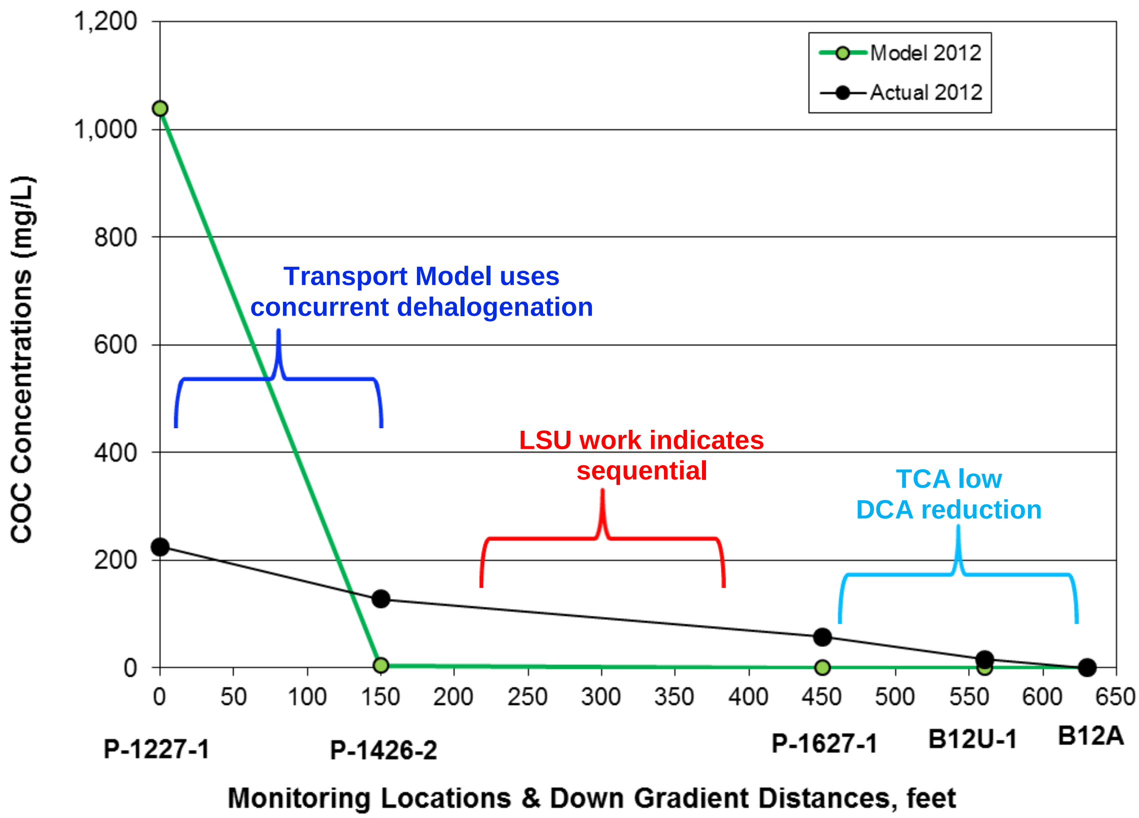
Figure 3-4. Experimentally measured TCA, DCA, VC and ethene in serum bottles inoculated with D. lykanthroporepellens BL-DC-9^{T}.



3.2.3 Groundwater Flow and Solute Transport Model Update

Initial microcosms conducted to access the reductive dechlorination of chlorinated alkenes and alkanes using bacteria from the Brooklawn OU where conducted in bottles containing pure COC in groundwater. This was done to map the production of daughter products and estimate reaction rates for the various dehalogenation pathways. As a consequence the groundwater model assumed concurrent dehalogenation of parent compounds as depicted in Figure 3-5. The figure shows the modeled prediction and the actual data from 2012.

Figure 3-5. Modeled versus actual primary transect trend data for year 2012, total concentrations are shown. Individual COC data is displayed in Figure 2-10.



The groundwater flow and solute transport model will be updated to incorporate contemporaneous COC and lithology data using a reaction package that supports the recent findings of sequential dehalogenation along the BPT. A forthcoming work plan will specify the objectives related to the solute transport model update.

4.0 CONTINGENCY PLAN

The OSWER guidance suggests a contingency plan to respond to a possible failure of remediation plans. The CD provides for long-term monitoring of the sites to ensure that the remediation continues as planned. Paragraph 16 of the CD states "If during the term of this Consent Decree, the monitoring program specified in the Conceptual Closure Plan detects the release or threat of release of hazardous substances, pollutants or contaminants from the sites, the Industry Defendants shall submit a supplemental remedial action plan to the United States and Louisiana for their review and approval in order to prevent or mitigate such releases, if necessary to protect the public health, welfare or the environment."

The CD and subsequent remedial planning documents provide adequate procedures to deal with unexpected conditions that may arise during the course of a remedial action. This was most notably demonstrated during the inception of remedial activities at the PPI site, when air emission levels necessitated the submittal of a Supplemental Remedial Action Plan (SRAP) resulting in modification of the approved remedial action. It remains NPC's position that these well established procedures are sufficient for contingency planning.

5.0 REFERENCES

Dillehay, J. L., Bowman, K. S., Yan, J., Rainey, F. A., & Moe, W. M. (2014). *Substrate interactions in dehalogenation of 1,2-dichloroethane, 1,2-dichloropropane, and 1,1,2-Trichloroethane mixtures by Dehalogenimonas spp.* Biodegradation (2014) 25:301-312.

EPA. (1999a). *Human Health Risk Assessment, Devil's Swamp, EPA Contract No. 68-W4-0016.* Baton Rouge, LA: US EPA.

EPA. (1999b). *Ecological Risk Assessment, Devil's Swamp, Contract No. 68-W4-0016.* Baton Rouge, LA: US EPA.

NPC. (2001). *Addendum A to the Brooklawn RPA Report, Volume 4, Waste Processing and Risk Based Remedial Action.* Baton Rouge, LA: NPC Services, Inc.

NPC. (2006). *Addendum F to the Remedial Planning Activities Report.* Baton Rouge, LA: NPC Services, Inc.

NPC. (2010). *2009 Long Term Monitoring Plan Report, Brooklawn OU.* Baton Rouge, LA: NPC Services, Inc.

NPC. (2012). *Addendum J to the Work Plan Brooklawn OU.* Baton Rouge, LA: NPC Services, Inc.

US District Court. (1984). *CIVIL ACTION NO. 80-358-B.* Baton Rouge, LA: Middle District of Louisiana.